

DRAGON USER



The independent Dragon magazine

February 1987

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Editorial

HERE at Dragon Towers it is the 1st of January, and the new year has well and truly begun. The last but has been cracked, the last cracker has been pulled. All we need to do now is sweep the office. Perhaps we'll find some of that copy which was supposed to reach us a week ago... Apart from the shortage of working days and a certain vagueness about what week, month, or year we are in, Dragon User's editorial team seem to have survived the festive season pretty well. Ask me about our contributors later... but Duckbeam have said that they are planning between three and six new games this year, which is good news from the suppliers' corner.

Thank you to the readers who sent 1986 show reports in, and a selection of those will appear next month. We may try doing a reader reply request again at points in the future. While we are on the subject of contributors, don't forget that anyone who wants to send in a review of any reasonably current program, on spec, is welcome to do so. Most of the time we won't be able to use them, but some of the time we will, and thank's about a tanner in it for any review we publish. Please follow the format used in Dragon Soft, give all the relevant information about price, supplier etc., a balanced description of the program and give vital ingredients your opinion.

How to submit articles

The quality of the material we can publish in Dragon User each month will, for a very great and varied depend on the quality of the material that you can feed with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to Dragon User for publication should not be more than 2000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped addressed envelope.

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Letters

Lost address

PLEASE would you print a message on your letters page for me. The message is:

"Would the person who sent me a tape some time ago please contact me as I have lost your address and am unable to return it. Please remember to try and identify some of the contents of the tape to avoid any chance of someone trying to mislead us. Many thanks, Mick Johnson."

I hope this will be possible as I feel a little guilty at not being able to return this person's property.

Also I am very interested in any new software for my Tandy 500. As any reader who has contacted me will be interested please let me know.

M. Johnson
28 College St
Boultbee Estate
Birmingham
B15 2PD

German's call

FIRST of all we'd like to say keep up the good work, as it's much appreciated. Secondly your review of *Steinhammer* in *CU* May 1988 was a little on the brief side but never the less we read and purchased it and want to take this opportunity to compliment Ray Coates on a superbly produced game and a masterpiece of machine code programming.

The game is a real joy to play but only comes in to its own upon entering the requested access codes to reveal what can only be described as a complete screen editor capable of redesigning or even creating your own personal screens. Who needs trees plotted! The access is only achieved by hacking into the game fixing the code word which is very cleverly hidden (it begins and ends with the letter "H") and that is only the first half of the protection they can contact us by letter for further help.

Finally due to lack of information of the *Dragon Plus* expansion board we would be grateful hearing from any other

owners of the *Dragon* board, to exchange ideas, programs, etc. and anybody wanting *FlexCDR* or more people who just own a *Dragon* if at all interested why not drop us a line?

The British-Dragon Owners Club of Germany
c/o Malsbende-Steinlein
Malsbende Str. 401
20085 Nordstedt
West Germany

Anti-amnesiac

I HAVE since I first bought a *Dragon* suffered from irremediable memory corruption and read/write and seek errors using my *DeltaDOS* cartridge. Recently I took a close look at the power supply and found that the voltage regulator LM7809C is only rated at 1 amp.

On checking voltages I found the +5V supply down to 4.75V. I assumed this was the cause of the problem.

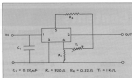
I replaced the regulator with the following circuit using the L7809 regulator from Maglin Electronics Supplies. This allows the voltage to be adjustable accurately to 5V and limits the current to 2A.

Since I made this modifica-

tion (and have not suffered any loss of memory errors) and I have been able to do away with the interference filter I have been using on my mains supply.

I hope you have readers who are interested in this information.

Ian R. Chippenfield
8 San Moller Close
Brixham
Devon TQ2 8UG



Call and response

FIRST of all, thank you for publishing my request for help in September '88. The response was better than we had hoped for, with letters from as far away as Sweden! I have had problems finding the time to reply and keep up communication with the many *Dragon* users offering help.

Could you please pass on an apology to those who have not yet had a reply, and a heartfelt thank-you from myself and the children to all the correspondents who have responded with software, listings and ideas to help the children enjoy our *Dragon*.

Help is still needed, particularly for children who have severe handicaps and can't use the keyboard or joystick, or need simple instructions.

Try to imagine using a computer programmed in Chinese while wearing boxing gloves!

We have several children with this degree of disability who would benefit from being able to access active control over something in their lives without the direct assistance of others.

A group of students from Plymouth Polytechnic Electrical Engineering department have written to me with the intention of setting up a project, and I have suggested that the

Dragon's ability to detect soft and loud noises of varying pitch and tone via the PIA could be used as a means of communicating with the computer hands off, so to speak. Voice recognition is far beyond the reach of any micro at the moment, but if a key too can be made to whistle back at you then I'm sure the *Dragon* can do better, with a little help from its friends!

I have managed to write a 'Music' program which responds to music from the cassette player, but need some sort of pre-amp unit to achieve direct control from a microphone, preferably with tone and volume controls for 'trimming'. One or two guitar effects have been tried with no success; the only thing which seems to work is a twin-tape stereo recorder with dubbing facilities (hardly a small cheap interface!).

If any reader could come up with a small unit, perhaps battery operated, or some interesting programs which will work from this type of input it would be a great help.

Here is a short listing which gives the calling values when sound is input through the cassette port. Using PIA-THRU statements, all sorts

of things could be possible (even more in BASIC). Perhaps if it could be determined which sounds trigger which combination of memory locations, thereby 'whistling key too' ideas might be expanded upon and put to good use?

Listing for Sound Peaks
10 CLS: MOTOR ON: AUDIO ON
20 C=0
30 FOR P = 65535 TO 65540
STEP 4
40 PRINT C,P,PEEK(P):
50 C=C+4
60 NEXT P
70 GOTO 20

I feel that this is a largely unexplored *Dragon* capability and, with a little experimentation, could open up a whole range of possibilities, given suitable programming and an interface which responds to sounds.

Once again, a big thank you to *Dragon* User and its readers for their help.

Stuart Beardswood
Westgate Childrens Home
70 Molesea Road
Elford
W. Yorks.

PS: I am not the proud owner of a *Dragon 64* which may be used at Westgate if we get any problems which require the extra memory facilities.

Taking control

SOME reflections about the program *Taking Control* in DU May 1986. Changes which you can do with the help of the ALTER program:

COPY: A right movement can only be done from lower to higher place in memory. No movements from (8000) to lower (Op-code 8045, 82 at 3700, ought to be 8145.) But if you try copying from (8000) to lower address than Source-dest will be Destination-Start? I suggest the following:

ALTER 80000 H: 10 to 20
80001 H: 80 to C0

FILL: The program does not fill the inputted final address. ALTER 80002 H: 20 to 30
EXAMINE: If you want to get the same directions as in Alter while using the up and down arrows, then:

ALTER 8000E H: 9F to 98

8000F H: 90 to 9F

80010 H: 0A to 9E

8001A H: 9E to 0A

INPUT BREAK: If you want to use BREAK when inputting: ALTER 80017 H: 80 to 80

81120 H: 9F to 80

81120 H: 00 to C0

8113A H: 80 to 27

81130 H: 80 to F0

81130 H: 90 to 81

81130 H: 00 to 00

81130 H: 27 to 27

8113F H: FF to 80

The only thing you lose is the loading cursor.

Martin Alvarian
dahleng@piagen 12
19111 Solentuna
Sweden

Empty promises

I JOINED a computer club advertised in *Dragon User* classified about six months ago, and paid its and sent five games, and at I got back was promises and a letter saying they were changing addresses. Has anyone else had this experience?

Stephen Bruce
11 Garth Grove
Ald Hoose Cst.
Hartlepool
Cleveland TS26 4EJ

Conway outfits or clubs which never get off the ground are a constant problem to specialists. If you want to join a concern you have never heard of before, use your 'nose' to judge whether they are reliable or not. Any club which asks for a high initial subscription, or asks you to send valuables such as tapes should be treated with caution. Good clubs should circulate lists or allow you to try their wares and newsletters/games/sale at a time.

Question corner

I HAVE been a *Dragon 32* owner for some years now but I have not really delved any deeper than playing games. However since discovering your magazine in my local newspaper I have been prompted to write to you in the hope of answering some long standing queries.

1) Can you supply a list of local *Dragon* enthusiasts?

2) Will any disc drive be *Dragon* compatible, if so, what make and how?

3) I have lost the documentation for *Telewriter*. How can I obtain a copy? Also I am having problems saving the text. Can you assist?

4) What are the pros and cons of cartridge and cassette?

5) Having recently purchased a *Telewriter* and *Telemaster's* Graphics System they appear to be very similar. What are their differences and how can I use them in conjunction with *Composor*?

6) Have you published reviews of *Telewriter*, *Rainbow Writer*, *Composor*, *Graphics System*?

7) I have a Smith-Corona Fastest 80 printer I should like to find out more detailed information on, as well as applications with the *Dragon*, eg screen dumps etc.

I realise I have asked a lot of questions but I would be eternally grateful even if you can only answer a few.

Chris Butler
6 Grove View
Shapton
Dorset
BH16 1SS

FOR information on disc drives, go and have a chat with one of your larger local computer dealers, another send an SAE to Peaksoft, 48 Queens St., Balcarran, Newark, Notts NG24 3AT, telling them what you want. They do a useful fact sheet.

Good service

I FELT I had to write to your magazine to tell you a story of service with a smile.

The following timetable of events is the best testament test.

Saturday 1st November: purchased SuperDOS chip at the Madstone show.

Sunday 2nd November: discovered SuperDOS and Rainbow Writer not completely compatible.

Monday 3rd November: phoned Overseer Software and explained the problem.

Tuesday 4th November: received my disc and covering

None of the programs you mention has been reviewed recently, but we have one of *Telewriter* coming up.

We hope someone can supply answers to some of Chris's more specific questions.

letter dated 18th November (the post is statistical round here) with problem solved and some very polite suggestions on how to improve my own program. I refitted the SuperDOS chip and found to my delight my program and *Rainbow Writer* work perfectly.

It is a service to find a firm still supporting the *Dragon* and offering a report of service that most firms gave up years ago that I felt other users should know we still have some very good people in business who should receive all the support we can give them.

Mr J. J. Steele
31 Bridges Close
33, Abchurch Lane
Thames
Kent

Heap of help

A COUPLE of months ago I phoned in your letters page for help in printing out some of my *Dragon 32* programs. As a result I received a mountain of mail for over six weeks. It was lovely to see other individuals, thanking them for their interest, I could be broken inside again. I'm now also a student — and you know how poor we are! I wish to take this opportunity, therefore, of thanking all of those who have written and hope that they will accept this as the only acknowledgement I can make. If you have been waiting long for a reply I can only say 'sorry'.

It is true that the *Dragon* family of users is a particularly close one — of necessity, but I think the reason behind the huge response is more than that. A common interest between people always promotes friendship, however typing away in a darkened room is not the best way to socialise and expand that friendship. Letter writing then breaks down the four walls of your computer room.

I may have stated the obvious here, but what are the results. I think there are three major ones:

1) The idea that computing is driving a generation away from personal micro — most of my correspondents were aged less than 16. All round literacy is essential in programming.

2) The so called generation gap is rendered non-existent, as young and old have valid contributions to make.

3) People are willing to give assistance to those who are ill at ease or new beginners. Thus, however insignificant my service, social responsibility is advanced.

What the reply to my request have shown me is that computing encourages attitudes which should be encouraged. As long as such people are in control of computers, I think we can sleep safely at night.

Tony Jenkins
c/o Hefy
Pembrokehire
SA42 8QZ

News desk

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

Better power supply unit

PEAKSOFT, now one of the few reliable sources of replacement hardware for the Dragon, have further improved the specification of their A1 Supasmooth replacement power supply.

The new model uses a "virtually indestructible" rigid polycarbonate box — which means that the components are now 100% bullet proof.

As with all A1 Supasmooths, the Dragon unit comes complete with a two year guarantee and lifetime service warranty. Peaksoft themselves say "It's the last power supply you'll ever need — guaranteed".

The A1 Supasmooth is available for £18.95 all inclusive from Peaksoft, 48 Queens Street, Balcombe, Newark, Nottingham NG24 3AG.

Because the latest Dragon component to show a propensity for expensive failure is the on/off switch at the back of the computer, Peaksoft also offer the Supasmooth with an on/off for an extra £2.50. This is covered by the lifetime warranty, and allows the user to avoid using the main's own switch, relying instead on the guaranteed component.

Peaksoft can be contacted for enquiries on (0535) 795230 (24 hour answering).

Broad sheet

Dragon User has received its first copy (although this is actually issue 2 — wonder where issue 1 went?) of a new newsletter called News from the Dragon. Composed of a good number of sheets stapled together in one corner, the newsletter is edited by R. A. Read, G. Maylor and P. Whitaker.

Most of the newsletter is taken up with reviews of games which have appeared over the last year. They have obviously heard of Dragon User — the editor's page mentions their "adventure hapline" and then says "We have also included a cheat page... this is basically

a round-up of those that can be found in Dragon User". The column also gives the John Penn show at Cardiff a favourable mention, and says that the projected software library will not now go ahead because postage costs are too high.

Those who have read Peter Whitaker's work in Dragon User will remember that he is an excellent software writer, and his contribution to "News from the Dragon" is a straightforward opinion column.

Contact: R. A. Read, 37 Ridgeworth Drive, Fallowfield, Manchester M14 6PL, with 0461.

No Eclipse

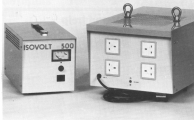
RECENT attempts by readers and Dragon User to contact Mr. Trevor Davies, Eclipse Feenar's proprietor, have so far proved fruitless. The West Midlands Consumer Service, who were formerly handling enquiries into faulty copies of Total Eclipse closed Feenar's file earlier this year in the belief that all the enquiries had been dealt with, and Mr. Davies assured us that the game was still on sale and that all exchanges and complaints reaching him would be served.

Unfortunately, a few buyers have still to receive a reply from Feenar, whose office has now closed.

Blaby say...

THAT they would like Dragon User readers to know that, although they are not promoting any new games, they still have copies of all their old games in stock. Anyone trying to get hold of a game can contact Blaby, who will often be able to supply a copy even when it is not on their current list. Contact Blaby Computer Games, Lutterworth Road, Blaby, Leicestershire, or phone (0533) 775641.

Perfect power



FOR THOSE who are getting really fed up into computer epilepsies may be interested to hear about a new range of ferro-resonant transformer giving guaranteed levels of mains regulation and line conditioning.

The Isovolt units can be used wherever it is essential to have a clean and regulated mains supply. Applications include computers, digital equipment,

photographic processing and industrial controls.

Fitted with equipment load meters and overload thermal trips, the units are maintenance free and simple to install and use. Robust construction and a noise level below 40dB make them suitable for office and industrial purposes. The standard range of power outputs are from 0.5VA to 1000VA. An OEM facility caters for special requirements.

Details can be had from Inter-power Systems Ltd., Holmes Court, Boston Road Industrial Estate, Harrogate, Wetherby, Tel: (05352) 5395.

Editor's Request

Did anyone out there receive a copy of Boulder Creek as a competition prize at any time since July 1985? And if so, when? Please could you drop me a line and let me know?

HERES THE LATEST MEGA HITS FROM



STONE RAIDER II

By Rolf Michelsen

Just like one of the greatest games ever "Boulder Dash". Guide Mario Around a vast number of caves, then find the exit leading to the next cave. To make things harder "Monsters", "Stones", "Walls", "Slime", even some wizardry has been included. With 25 different caves to explore and hundreds of gems to pick-up you're guaranteed hours of fun.



AIRBALL

"Now you're really in trouble," said the evil wizard from "Wizards Quest", "I'm turning you into a ball and sending you into a mansion with over 150 rooms!". "If that sounds easy I'm telling you it's not, the ball's got a slow puncture and you'll need to jump on a pump to pump it up in some rooms, but take heed, if you pump it up too much it will burst! In the rooms you'll

have to pick up objects I've left, such as crosses, tins of beans, a Buddha, a dragon statue, a pumpkin, a flask and also 116 crates that you'll need to get over obstacles! At the end of the maze is a spellbook that will turn you back into a human again."

"Sounds easy," you say to the evil wizard.

"Does it now! well I'm putting spikes in the rooms as well, not just one kind but three different kinds that react differently and killer pads on the floor, you've got no chance of success... Ha! Ha! Ha!"

AIRBALL . . . THE LATEST AND GREATEST GAME FROM EDWARD SCIO — £5.95

POST & PACKING £1 PER ORDER

Order by phone



Tel 0726 68020

Order by post

Microdeal

Box 68

St Austell

Cornwall PL25 4YB



BOSS DOS

The new DragonDOS plus 2.3 is a definite improvement, says R.E. Warwick

WITH the appearance of an 'improved' DRAGONDOS — DRAGONDOS plus 2.3 — the question on everyone's lips is 'Is it a worthwhile improvement?'. This article is intended to aid your assessment in answering that question.

There are a large number of changes incorporated, a few of which affect the 'user interface', including one new error code, FTR, if an attempt is made to step beyond the track limits, for example attempting to access track 80 on a 40-track disc.

There are no new BASIC commands or functions, but many have been extended (including some not previously used with discs), while error checking has been tightened and a more disciplined approach is required in some areas, especially when changing discs. It also appears that all the DRAGONDOS version 1 errors have been corrected (including any still in version 4 from Garthwaite) and no errors introduced.

The first of the many changes comes to light at power up, with the BASIC copyright and DRAGONDOS plus messages appearing without delay and remaining on screen (as in the corrections of May 1985 issue of DRAGON USER). This is followed by disc drive 1 starting, though no head movement occurs unless a disc is in the drive, when the system attempts to 'autoformat'. If the disc is not bootable, a NOT error occurs. The lack of head movement for TNR errors is a feature of this DOS, which will also handle hardware ready signals from disc drives, if the cartridge is suitably modified.

If you are still in BASIC, the next revolution is probably keyboard repeat. This is implemented for both DRAGON 32 and 64 (where it is similar to the normal repeat). In addition, a key rollover is implemented — non-repeating a lot of characters in many ways, just these two additions make this DOS worthwhile. A single F10 key will be useful to select between the three options of 'repeat and rollover', 'rollover' and 'normal' operation. The ability to turn off repeat and roll over is essential to avoid interaction with similar facilities built into programs (such as in Disc Dream). It may be argued that by changing the default user interface, this is the wrong way round, but I believe most users will want repeat on rather than off.

The easiest way to show the remaining improvements is to look at each of the BASIC commands and functions that have changed:

AUTO — With the new version of AUTO, 16 bit overflow has been trapped and the line numbers do not wrap if they pass through the 16 bit limit (for example, AUTO 10000,10000 stops after line 10000, whereas in version 1 line 10000 is followed by lines 2484, 2484 etc).

Table 1 — BACKUP timings (seconds)

	40 Tr	80	60 Tr	80
OLD, Verify on	176		704	
OLD, Verify off	60		162	
NEW	47		162	

BACKUP — The first change with BACKUP shows up in the time taken to do a copy, even though the output disc is always verified. If two drives are used this is reduced by over two thirds compared with the VERIFY ON time and increased by less than one third compared with the VERIFY OFF time. Table one gives comparative timings (in seconds) for two drive types. The other change is noticeable when using a single drive as the motor stops very quickly when a disc change is needed.

BOOT — The change here is not obvious, in that it affects the program loaded. With the new version, the default drive is set to the one specified in the BOOT commands. This, I believe, is a more logical approach.

CHAIN — The improvement that has taken place with CHAIN is in user friendliness and will not be obvious with existing programs. However, the first time the command is used without a call to PEEK at the start of the chained program, you will find that all the things are still available. The reason, quite simply, is that the string 'percentage collector' routine is called from within CHAIN just prior to transferring control to the called program, setting the 'bottom of string space' allocated pointer. (This is quite subtle, since it is these strings, the only effect is a slight delay while the variables table is scanned).

CLOSE — Following the lead set in the May 1985 correction, it is now possible to close individual files. Memory location 247 is used to control this, giving three options:

—0 close all files on a drive (the default after power on or RESET)

—Close the last file accessed (as May 85 correction)

—01 close the file using the specified control block (see also OPEN)

In addition, CLOSE is used to clear the disc buffers and, if not a single file close, to set the drive(s) status to unused ready for a possible disc change.

DIR — A number of changes have been implemented here. The most obvious are:

A heading line, with the disc name and whether the disc can be loaded.

A slow scroll, making it easier to stop and linger.

A file count as well as the number of free bytes on the disc.

I understand that originally the output was to be paged (as in version 4) 14 lines at a time, but this required long pauses between pages due to the large eye movements needed to read the information. This was dropped in favour of the slow scroll, which conveys information more quickly as it is possible to continuously read the output.

As a result of correcting a fault in the DIR command which corrupted the first control block, another feature has been included that allows a directory listing to be directed to any valid open stream — including to drive files (though tape and disc files must be OPENed first to assign a stream number). These files are in standard data format and may be processed by program if required.

DISKMT — The operation of this command has been speeded up markedly (especially noticeable with 60 track, double sided discs) and the ability to name discs added. If the first parameter is a string constant (not a string variable), this is used for validity (the format of a disc name is the same as for a filename) and written to the disc's track. In addition, there is a display of the track being written or checked as formatting takes place — at least there is something to watch now! The problem of the computer 'hanging' when formatting discs has also been eliminated, as it was in the later 'corrections' for version 1.

BCF — In line with **CLOSE**, **BCF** has been extended to allow a stream number to be specified as an alternative to the filename for disc files.

FWRITE/FREAD — The internal operations of these two commands have been changed, resulting in the correction of a fault when using **FOR**. Whereas in version 1, a write always transferred the correct number of characters, filling with spaces if required, the input commands included a notional in the count. The result was that an extra character had to be requested to get the required number of characters read in. A secondary effect of this was that the read was not to be lost. The new version always returns the correct number of characters, adding a **CR** to the end if needed. No characters are now lost.

After the effect resulting from the change manifests itself when the **FOR** length does not contain sufficient values for the **FREAD** variables list. With version 1, the last value is repeated for unsatisfied variables in the list, resulting in a possible error if mixed strings and numeric variables are left. The new version returns null strings or zeros in this situation. (I have never used this capability, but the new strategy seems more consistent with what would be expected).

FREE — This now guarantees to return a positive value.

FWRITE — In version 1, it was not possible to use **FWRITE** in direct mode as a programming error caused all files to be closed each time a file was input from the keyboard or cassette. This error has been corrected and a direct **FWRITE** is now allowed. It is also noticeable that the internal operations have changed (none of this later) as write operations are a little slower.

INPUT/LINEINPUT — The capability of these two commands has been extended to include input from disc files. The method of use is exactly as for tape input by using stream numbers (see **OPEN**).

LOAD — For the casual user, there appears to be no change to the **LOAD** command. However, for the more experienced user, a file type 3 (Segmented Binary) has been added to the type 1 (BASIC) and type 2 (Binary) formats. It is not possible to generate such a file directly from BASIC through **SAVE**, but it is now possible by using **FWRITE** or machine code. The file is similar to a number of type 2 files joined together, ending with a zero length 'entry block' (this allows, for example, a 'loading screen' to be displayed, the disc workspace to be stopped and the main program loaded), followed by an 'autoexec' block by using a single **LOAD** command.

LOCIOFF — These have been corrected as for **FREE**, and always return a positive value. Also, as for **BCF**, **LOC** has been extended to allow the alternative of stream numbers (**LOC** is essentially meaningless without a filename). In addition, as the use of **LOC** is only sensible if a file is already be-

ing read, it has been changed to respond with **NO** if the file specified is not open or the control block is not in use.

OPEN — This command has been extended to include the ability to open a disc file, allocating a stream number in the range 1 to 10 (corresponding to the 10 file control blocks and used by **CLOSE**, **BCF**, **INPUT** etc). If the file is already allocated to a control block (even the one specified), an I/O error is generated, while if the file is not open, but the control block is already in use a 'FOR' error occurs. In addition, an emergency mode of opening results in a 'TIN' error (note that this includes attempting to open a file for **INPUT** that does not exist). There are 4 modes of file opening:

1 **INPUT** the file must exist, but access is not restricted to reading

2 **OUTPUT** the file is opened in the same way that **FWRITE** opens files

3 **CREATE** mimics the operation of **CREATE**

4 **EMPTY** kills an existing file and then **CREATE**s a new length file

While this does not increase the facilities available for opening files, it does allow a specific control block to be allocated to the file for use by **CLOSE**, **INPUT** and **PRINT**. The overall result is that any combination of **INPUT**, **FREAD**, **FWRITE**, **PRINT** etc may be successfully used with files explicitly **OPEN**ed.

PRINT — With version 1, unpredictable results were obtained if **PRINT** was used with values in the range 1 to 4. This has now been corrected and provided the control block is in use (which implies **OPEN** has been used), the command will work correctly. Values of 5 greater than 10 give a 'COM' error, while referencing control blocks that is not in use gives a 'TIN' error. Note that **PRINT** is synonymous with **FWRITE** under **PROCAL** and **FOR**.

PROTECT — This now operates as described in the May 1988 corrections. If **ON** and **OFF** are both omitted, **ON** is assumed.

RENAME — Whatever the version 1 manual may say, **RENAME** never transferred a file from one disc to another, although the actioner when it did was attempted was not consistent. The new version rejects an attempt to use two different drives when renaming a file, giving a consistent and correct sequence of all times. The command has also been extended to allow discs to be renamed without loss of data, so all your version 1 discs can be easily named. To use this feature, the 'old filename' parameter is replaced by the drive number, in the form 0:n.

SPREADWRITE — With version 1 of **GRAPHICS**, an error was generated even if an attempt was made to read/write a track greater than 79, allowing 40 track

drives to attempt to step beyond limits. With the new version, an error trapping has been changed and an error is normally generated if an attempt is made to step beyond the drive limits. However, if **SPREAD** or **SPWRITE** is used immediately following power on or **CLOSE** (ie before the directory is accessed), no track checks are performed. This provides a necessary facility to read/write non-DRAUGHTS discs.

VERIFY — This command operates in a similar fashion to **PROTECT**, in that **ON** is the default. Again the version 1 manual was incorrect in its description of this command, as the directory tracks (16 and 20) are always verified in both **DOS** programs, only the data track verification is affected. Note that the new version still verifies information on **SPREAD** verifying cassette tapes — the data is checked for being readable and valid, it is not compared with memory.

That covers all the direct Basic changes. However, as I have hinted there are other changes including improvements in machine code address of discs and files.

Firstly, back to my statement on a more disciplined approach. Internally, disc I/O buffering has been modified so that information is not 'thrown away' unless necessary, ie when the buffer needs to be used for another sector or the discs are being changed. Unlike version 1, it is not assumed that discs will be changed at any time the motor stops, although any buffers which have been modified are written at this time (and verified if **VERIFY** is **ON**, unlike version 1 which ever verified in this situation). However, because the buffers are still open, it is possible to write information to a buffer after the motor has stopped, without the disc being overwritten.

Also, as sectors are formatted for interleaving written and are not returned at motor time out, disc space could be lost, and the new disc overtyped, if discs are changed at this time. With the new version, a disc change is assumed whenever all buffers on all files on one drive are closed, the buffers are cleared and unused sectors returned at this time. This means that **CLOSE** or **END** which calls **CLOSE** into **wait** writes over when discs are to be removed.

This need to call **CLOSE** does introduce one annoying feature, it has to be used between directory listings if discs are changed, to ensure the new disc directory is listed. If it is not, the 'old' disc directory may be supplied from buffered sectors. However, this usually only occurs when there are a few files on the 'old' disc.

A further result of the changed disc I/O handling is the availability of 'on demand' character I/O through the normal character handling routines at **BSSA** (for input) and **BSSAA** (for output) by using the stream number in memory location 111 (80H). Obviously, the files have to be opened first in the 'read' way. This means that disc files can be treated exactly as keyboard, cassette etc, with I/O errors trapped in the normal way through a vector in the error routine 'user hook' at \$180. This is a major improvement in disc filing handling.

Figure 1

```
OPEN "Q",#. "name" : POKE 111,n : LIST
```

Figure 2

```
OPEN "I",#. "name" : POKE 111,n : EXEC 33656
```

Figures 1 and 2 give examples of what can be done with the new IO handling described. The first is a means of producing a data format file of a Basic program (or part program); the second provides a "merge" facility for such data files.

Note that if the cassette is the selected stream and remembering to use 336 in the POKE, both examples will still work, giving a simple partial SAVE and MERGE for cassette users.

Table 2 — DOS entry table

address	routine/function accessed
\$C000	General disc operation (restore, seek etc)
\$C005	Address of data table for \$C001
\$C008	Validate filename and copy to "current drive block"
\$C00A	Copy directory entry to control block
\$C00C	Create directory entry, with backup
\$C00E	Load end of file detail into control block
\$C010	Find control block for drive and close file
\$C012	Close file for control block specified
\$C014	Load file into memory
\$C016	Copy memory to file, verify if OK
\$C018	Count free space on disc
\$C01A	Kill file and free sectors
\$C01C	Set file protection
\$C01E	Rename file
\$C020	Get directory record
\$C022	Find free buffer and read sector
\$C024	Copy updated directory sectors from track 80 to track 10
\$C026	Read absolute sector
\$C028	Write absolute sector, no verify
\$C02A	Verify absolute sector
\$C02C	Initialize disc
\$C02E	Disc offset \$C005 table base address
\$	new entry in table

As mentioned at the start, in addition to all disc errors now passing through the "user error loop" at \$180, error handling has been dramatically improved, with the result that almost all errors are detected and trapped. In almost all cases where errors are undetected, it is because the error check that could be done has been suppressed for a good reason. For example, track limits are not checked during DDFMT (it is assumed that the number of tracks are as specified) or before a directory access has occurred after CLOSE or power on. As track checking relies on the disc format information within the directory, this latter action allows non-DRAGONDOS format discs to be processed. Any directory access (DIR, file IO etc.) loads the format for checking. This makes accessing different disc formats on one drive easy, as closing a disc clears the format information.

In other areas, error handling is more consistent; for example, null filenames are rejected for all commands, no head movement occurs if TMR generated and thereafter error now occurs in about 15 seconds instead of 50. The only real problem is a write fail at motor time out, when the Basic error routine is still entered, even when running a machine code program, though this can be trapped through the user error loop.

Errors that have been corrected (which do not appear to have been published before) include:

1) Files on double sided discs could be processed incorrectly immediately following the first disc access.

2) The last file control block was corrupted whenever 19 to 30 of track 80 of a double sided disc were written.

3) The last file control block was corrupted whenever DIR was used.

4) File extensions could be appended to the wrong file if a large number of files were on the disc (more than 127), or if the master file record and the extension record were separated by more than three disc sectors.

The only change remaining, which affects machine code users, is that the routine entry table has been extended by three entries and the PROTECT(FNAME) entries corrected. The list of routines now accessible is given in table 2.

In summary, I have found the new version very worthwhile, with no program changes needed (I always use the good programming practice of CLOSING files before ending programs anyway) and programs for other machines using MPU/TTPMT easier to implement. However, perhaps I should add a word of warning at this point. I have found that almost written programs run successfully, but that those which are "illegal" entries into DOS routines always fail. This, I think, is because MORE of the routines in the new DOS start at the same address as the corresponding version 1.0 routines.



Acknowledgement: I am indebted to Phil Scott, who produced this new DOS, for supplying information on the internal workings of both DRAGONDOS and DRAGONDOS PLUS, and for the examples in figures one and two.

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Dragonsoft

Now software for review should be sent to Dragon User,
12-13 Little Newport Street, London WC2N 6PP.

Program: Teletexter
Supplier: Microdeal
Price: £225

I HAVE been using my Dragon 32 for three years and for the first two it was a games machine. Then I obtained a copy of Teletexter by Microdeal, and my whole life changed!

A word processor allows a useless typeist to produce perfect copy every time. The problem of word lines is taken care of automatically by a feature known as 'word wrap'. This makes sure that a word is not split onto two lines on the screen. At any time it is possible to enter any character on the screen, delete whole lines, search for characters or strings, copy blocks of text to a new position, in fact to re-arrange the text how you like.

The disc version of Teletexter loads in a few seconds using the BIOS command, then you can choose between black characters on a green or a white background. The white background means it looks best on a colour television. The next choice is which version of Teletexter you are using. Four options are for specific printers, and the fifth is a general version

which works with any printer. You then come to the first of three menus. At this becomes second nature after a few uses.

The first menu deals with saving and loading files on cassette, as well as accessing the disc menu and the format menu. The latter options are accessed by using the first letter of the command required. (Edit moves the display to the high resolution screen, and you can start typing. The characters go onto the screen on 24 lines each of 81 characters. By using SHIFT you can type in true upper or lower case. While in Edit mode, the CLEAR key acts as a CONTROL key as is found on many other micros. Various functions are accessed by pressing CLEAR and one other key — for instance, CLEAR Fwd) allows you to search for a specific string of characters. CLEAR Fwd) moves the cursor forward one page. CLEAR K deletes the current line. All the keys auto-repeat, except BREAK and ENTER. When you have finished typing, pressing CLEAR (Back) sends you back to the first menu.

Pressing F in the first menu

takes you to the Format menu, from which 'F' will send you work to the printer. The Format menu allows you to alter line length, left margin, top margin, line spacing, text page numbering etc. from the default values. You can also arrange for only a part of the text to be printed. A typewriter mode allows you to type text to the printer line by line. If required control codes can be sent direct to the printer. The clever thing about Teletexter is that all these parameters can be embedded into your text so that they can be changed dynamically as the text is being printed.

This allows files to be saved or read information as well as again the file is to be appended to one already in memory. Pressing C is the equivalent of CTRL in Basic. Names of files can be changed or killed provided they have the Teletexter file extension TEX. Teletexter automatically adds the file extension to any file saved.

The main drawback of Teletexter is that the text is not What You See is What You Get on screen. An 80 column display would be an advantage, but would need a good quality monitor to see the

results clearly. The text can look peculiar particularly if you need more than 50 characters in a line, and the effect proceeds to centre the text, underline, etc. are not apparent until printing takes place. The Format menu cannot be accessed directly from the Disc menu without entering the file names and then the start menu. This can be tedious.

The disc version allows files over 10000 characters in length and the cassette only version allows about 2000 more which is quite adequate for most home uses. The AA store manual supplied is easy to follow and explains all the functions of the program giving examples where necessary. The keyboard response is not very good, and you do not see characters when typing fast as happened on earlier versions. In 1983 the program cost £48.95 which put it out of the reach of many users but now it costs £225 (cassette or disc upgrade) it represents a startling value for money.

Miller Hayes



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Dragon Answers

Dot vs. daisy

I AM considering buying for my Dragon 32, but I am not sure what sort I really need. I want to be able to fit my basic programs and perhaps do some word processing too.

Any advice you could give me would be gratefully received.

Arthur Cameron
Kings Norton
Birmingham

THE Dragon's printer interface is of the parallel kind, so you will need to check that any printer you are considering has a parallel interface as well (most do these days).

It seems your basic choice is between two types: the first is a Dot/Matrix printer, which prints like a typewriter, giving very high quality output. These are usually quite slow and can be expensive (although they start at under £200).

Alternatively, there are dot matrix type printers, which are faster and have the advantage of usually allowing screen dumps (graphics). However, the quality is much poorer as they are, so the characters are made up of individual dots. Some printers now offer NIB (near letter quality) print, where the dots are much closer together.

As a general purpose printer, the dot matrix is your best choice, but if you intend to do a lot of serious word processing then consider a daisy wheel type.

Mouse shortage

A FRIEND of mine has a BBC Micro and with this he uses a 'mouse' device to draw on the screen. Could you tell me if there is a company that makes a mouse for the Dragon and if so at what price?

Tony Porter
Sole
Cheshire

I DO not know of any company that (yet) makes a mouse for the Dragon. Why not consider a light pen instead? These are cheaper than a mouse and there are quite a few available for the Dragon. One of the better ones is the 'Sargus' from Datapoint Technology at Riverside Road, Swinton, Leeds, (tel. (0534) 770888). This costs £250 including VAT and p&p.



Blowing a fuse

THERE SEEM to be thousands of Dragon users transformed into ex-Dragon users by their transformers burning out. Contrary to popular belief, this can be fairly easily repaired. This is what you should do:

- 1 Take your faulty transformer into a radio repair shop.
- 2 Tell them to open it up by drilling out the rivets. (This is usually where the repair people get reluctant, but remember: what have you got to lose?)
- 3 Let them replace the fuse that has blown, most often the 12V one, usually, the actual transformer is in a burning state!
- 4 Let them close the box with rivets, the next repair will be so much easier!

DON'T try this yourself unless you're a professional. 240 volts is a killer. The electric job should take about half an hour and not cost more than £10.

IF it anyone is looking for Swedish/Finnish word processing software or software to access and download from electronic mailboxes, contact me!

Martin Vanner
Punkaharju 4 B 14
SF - 00520
Helsinki
Finland

MANY THANKS for all the letters on the subject of transformers — the moral is that they can be repaired by PROFESSIONAL, COMPETENT PEOPLE. The mailing strongly advised against amateur meddling — a point that cannot be made strongly enough.

Of course, now a reconditioned transformer are now available from a number of sources — Windy and Paulson to name but two.

Less than zero

I AM writing a bank account program for my Dragon 64 and disc drive. The problem I have is, when printing out money values such as £1.90 or £38.00, these appear as 1.9 or 38. How can I make the other zeros appear? Everything seems alright with numbers like £1.33.

Gill Legg,
Chalfont,
Bucks

YOU NEED to use the PRINT USING command. Full details of this are given at the end of the Dragon Manual. This will allow you to have full control of output format. To get a variable (eg 10) printed with two decimal places, you can use the following:

PRINT USING "###.##" 10

Device channels

I HAVE recently built myself a serial interface to plug into the Dragon's cartridge port. All seems to work well, but to send data to it I have to use several FORGAs from Basic.

I have a knowledge of 68000 machine code and would like to know if it is possible to link a new device interface so that I could use the OPEN/LOG/PRINT commands with say a channel number 3.

Brian Smith
Inverness
Scotland

IT SHOULD certainly be possible to link new device channels into Basic. You will need to use the versions of 380, 390 and 391. The first is called when a device is opened,

the next when a device number is verified as legal, and the third whenever a character is to be output to any channel. See the firmware version past issues of DQ for more details on the firmware vectors and how to patch them.

Coding

I HAVE a RS232C/H0400 Rate interface matched to a modified SC88 Data Link through the cartridge port of my Dragon 32. The test program checks out correctly. I now need to know the coding to transfer printer port operation to the cartridge port.

John Perry

THE actual code you will need to write will depend upon the configuration of your particular interface. However, the method of interrupting printer output is always the same.

This is achieved using the vector of 388, in a similar way to that described in previous issues for refreshing screen output. The following code should provide a basic outline for your code, simply EXEC the 'INIT' address once to set up the new printer driver.

```
INIT LOG (CPI
$16,150
LOG OUTPUT
STX 388
RTS
PRINT POKS 8
LOG TTI
CPI# 1-2
RTS OUTC
PUS 4,PC
OUTC PUS 4
LOG 2,5
INSTR (CODE TO PRINT
CHARACTER
RTS
```

Easy access

I HAVE recently given my Dragon 64 as a birthday present and am writing a game for this in machine code. What I need to know is how to access the joystick ports in machine code — what hardware address are these located at and how do I interpret the values there?

Jason Davies

THE simplest way to read the joystick in machine code is to call the PEEK routine at 4840. This will leave the positions of joystick 0-2 in locations 340 to 345. These will be the same values as are returned in Basic (ie between 0 and 63).

Epson made easy

Pam D'Arcy sticks a few handy labels in her Epson compatible printer

WHETHER it will continue, who knows, but Epson has long been the printer industry standard. Cheaper printers, fortunately, are now available and many are described as "Epson compatible," meaning that identical control codes are used to call up the bewildering array of options, including a number of readily available different-sized typefaces and character sets for nine different countries.

The options can be called from a Basic or machine code program by sending sequences of control codes to the printer, usually preceded by CHR\$(27), known in the ASCII character set as the ESCape code.

Because of the bewildering array of options — and never being able to find the page I want in the Epson manual is a turn — I worked out some time ago a couple of "junk" sheets of the more commonly used options.

I am not in favour of repeatedly typing in CHR\$(n) statements (because it is long winded and greatly increases the chances of a typing slip, so I also set up a "base print" program (Listing one). Any time that a printing job needs doing (usually in my case a labels job) I take the "base" program and add the specific print details to it, saving it in its own right in case I need to do something very similar again.

The POINT BASE program simply consists of setting up the more commonly used CHR\$(n) values and printer options in STAMP/VARIABLES, giving them memory saving names where possible.

From Figure two I can then quickly find the names of variables that I would need to print information in any of the readily available typefaces and densities. For instance, to print DRAGON USER in normal sized double strike (= darker print) labels, I would load in the POINT BASE program, then add the line
100 PRINT A-Z,M,N,O,Q,R; "DRAGON USER"; M;O;O;S

As can be seen from the table, the variable names are reasonably close to the option and are consistent (ON Condensed Normal; O on option ON; K on option OFF; D Double-Strike; I Italics etc.).

As one cannot include a quotation mark as part of the text in a Basic variable string (as it is a string delimiter), a string variable (X%) has been set up in readiness for it to be used (eg. for either side of DRAGON USER above).

100 PRINT A-Z,M,N,O,Q,R; "DRAGON USER"; A;S;X;S;X;S
The Z;S-X;S is the character sets for the different countries (ie English set prints a pound sign for £). The letters Z;S;X;S is an "initialise the printer" string that clears the print buffer, switches off any of the options

Listing 1 — Print base program

```
10 REM BASE FOR AN EPSON PRINT PROGRAM
20 CLEAR
30 CLEAR=0000
40 REM..... ESC. VALUES
50 A$=CHR$(10)
60 B$=CHR$(12)
70 C$=CHR$(13) : REM "ESCape" CHARACTER
80 F$=A$+"F"
90 P$=A$+"P"
100 A$=CHR$(34) : REM QUOTE CHAR
110 A$=A$+"S"
120 A$=A$+"-"
130 A$=A$+"T"
140 A$=A$+"H"
150 REM..... FORMAT CODES
160 F$=CHR$(18) : REM BACKSPACE
170 P$=CHR$(17) : REM FORM FEED
180 F$=CHR$(18) : REM LINE FEED
190 F$=A$+"D" : REM CANCEL SKIP OVER LINES
200 REM..... MODES
210 REM..... CONDENSED
220 C$=A$+CHR$(34)
230 C$=A$+CHR$(4)
240 REM..... ENLARGED ALONE
250 E$=A$+CHR$(40)
260 M$=A$+CHR$(32)
270 REM..... ELITE
280 L$=A$+CHR$(32)
290 L$=A$+CHR$(1)
300 REM..... NORMAL
310 N$=A$+CHR$(0)
320 N$=A$+CHR$(0)
330 REM..... OPT 100%
340 O$=A$+"S" : X$=A$+"S"
350 O$=A$+"S" : X$=A$+"S"
360 O$=O$+A$; X$=O$+A$
370 O$=O$+A$; X$=O$+A$
380 O$=A$+A$; X$=A$
390 O$=A$+A$; X$=X$
400 REM..... CHAR SETS
410 Z$=A$+CHR$(4) : REM Dansk
420 Z$=A$+CHR$(3) : REM UK (English)
430 Z$=A$+CHR$(1) : REM French
440 Z$=A$+CHR$(2) : REM German
450 Z$=A$+CHR$(6) : REM Italian
460 Z$=A$+CHR$(0) : REM Japanese
470 Z$=A$+CHR$(7) : REM Spanish
480 Z$=A$+CHR$(8) : REM U.S.A.
490 Z$=A$+CHR$(5) : REM Swedish
500 REM..... INITIALISE REQUEST
510 Z$=CHR$(24)+Z$+N$+X$+X$+X$+X$ : REM
CLEAR BUFFER/USA CHAR SET/NORMAL MODE/
ITALICS OFF/SUPERSCRIPT OFF/UNDERLINE OFF
1000 REM..... USER'S PRINT PROGRAM GOES HERE
```


[illegible]

that may have been set that can only be cancelled by specifically unsetting them, sets the typeface to 'normal' and the most commonly used character set (USA).

Listing two contains the lines of a program added to Listing one to form a general label printing program. It is my basic, general label printing program. Lines 2100-2300 are lines 1-12 respectively of the most commonly printed label that I use — cassette labels on a roll. Only ten lines can be printed on the label itself, the other two lines represent the spacing between labels, namely EIGHT lines 2100-2300 as required to produce a specific cassette label program and save it as such. (As can be seen, it is the actual program I use to print CHS/FIX software cassette labels, if I need to print labels of less depth, I simply REMOVE or DELETE the excess PRINT lines; longer labels simply require a few additional PRINT lines before the RETURN.

The program looks more complicated than any you may need as it makes use of the ability to replace any of the characters with your own creation. Lines 1000 and 1100 create a copyright symbol in place of existing character 128 (to struggle to me in the Epson set — it probably has an official name). Additionally, although not used in this example, lines 1050 and 1080 set up strings to enable the line spacing to be adjusted (for instance, being an even number of normal print lines — six to an inch — if a was required to print exactly half an inch down the label, five and a half 'normal' line feeds would be needed before and after the line itself).

Line 1030 sets the left margin — just adjust the figure in the brackets as required. Line 1100 includes switching off the 'skip over perforations' option that would cause labels if left switched on in a label print program.

The run commences with a simple 'feedprint' option that prints a single label to enable the alignment to be properly set against options to be checked before diving into printing hundreds of labels. Line 1100 initializes the printer for this label run (E25 as mentioned previously, plus substitute copyright character for CHRS(128) plus left margin plus turn off skip over perforations).

Lines 2100-2300 are the label print subroutine proper.

Once the number of labels required has been entered, on a Dragon 32 the printing can be terminated at the end of printing the current label by holding down the space bar (or other key just shift alone). There seems to be a bug in the Dragon-32 that I haven't seen mentioned to date, in that printing can only be interrupted as on the 32 (LIST/PRINT, for instance, does not respond at 64). Similarly, once you get it to prematurely terminate label printing, so to speak RESET is an easy option.

After the run is completed without interruption, a sample label (subroutine lines 4100-4300) showing some of the typefaces that can be obtained will be printed out by answering 'Y' to the prompt. The square brackets (line 4100) are obtained by SHIFT plus DOWN and RIGHT ARROW keys. Subroutine lines 4800-4900 prints on the

Figure 1 — Epson options as basic variables

Dragon 32			epson set		Dragon 32			epson set	
Dragon 32	Line	Normal mode	Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
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			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
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			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
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			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	Line
			Dragon 32	Line	Dragon 32	Line	Normal mode	Dragon 32	

Figure 2 — Epson options as decimal codes

Dragon 32 line	epson set	Dragon 32 line	epson set	Dragon 32 line	epson set	Dragon 32 line	epson set
21 100 0	000	22 100 0	000	23 100 0	000	24 100 0	000
25 100 0	000	26 100 0	000	27 100 0	000	28 100 0	000
29 100 0	000	30 100 0	000	31 100 0	000	32 100 0	000
33 100 0	000	34 100 0	000	35 100 0	000	36 100 0	000
37 100 0	000	38 100 0	000	39 100 0	000	40 100 0	000
41 100 0	000	42 100 0	000	43 100 0	000	44 100 0	000
45 100 0	000	46 100 0	000	47 100 0	000	48 100 0	000
49 100 0	000	50 100 0	000	51 100 0	000	52 100 0	000
53 100 0	000	54 100 0	000	55 100 0	000	56 100 0	000
57 100 0	000	58 100 0	000	59 100 0	000	60 100 0	000
61 100 0	000	62 100 0	000	63 100 0	000	64 100 0	000
65 100 0	000	66 100 0	000	67 100 0	000	68 100 0	000
69 100 0	000	70 100 0	000	71 100 0	000	72 100 0	000
73 100 0	000	74 100 0	000	75 100 0	000	76 100 0	000
77 100 0	000	78 100 0	000	79 100 0	000	80 100 0	000
81 100 0	000	82 100 0	000	83 100 0	000	84 100 0	000
85 100 0	000	86 100 0	000	87 100 0	000	88 100 0	000
89 100 0	000	90 100 0	000	91 100 0	000	92 100 0	000
93 100 0	000	94 100 0	000	95 100 0	000	96 100 0	000
97 100 0	000	98 100 0	000	99 100 0	000	100 100 0	000
101 100 0	000	102 100 0	000	103 100 0	000	104 100 0	000
105 100 0	000	106 100 0	000	107 100 0	000	108 100 0	000
109 100 0	000	110 100 0	000	111 100 0	000	112 100 0	000
113 100 0	000	114 100 0	000	115 100 0	000	116 100 0	000
117 100 0	000	118 100 0	000	119 100 0	000	120 100 0	000
121 100 0	000	122 100 0	000	123 100 0	000	124 100 0	000
125 100 0	000	126 100 0	000	127 100 0	000	128 100 0	000
129 100 0	000	130 100 0	000	131 100 0	000	132 100 0	000
133 100 0	000	134 100 0	000	135 100 0	000	136 100 0	000
137 100 0	000	138 100 0	000	139 100 0	000	140 100 0	000
141 100 0	000	142 100 0	000	143 100 0	000	144 100 0	000
145 100 0	000	146 100 0	000	147 100 0	000	148 100 0	000
149 100 0	000	150 100 0	000	151 100 0	000	152 100 0	000
153 100 0	000	154 100 0	000	155 100 0	000	156 100 0	000
157 100 0	000	158 100 0	000	159 100 0	000	160 100 0	000
161 100 0	000	162 100 0	000	163 100 0	000	164 100 0	000
165 100 0	000	166 100 0	000	167 100 0	000	168 100 0	000
169 100 0	000	170 100 0	000	171 100 0	000	172 100 0	000
173 100 0	000	174 100 0	000	175 100 0	000	176 100 0	000
177 100 0	000	178 100 0	000	179 100 0	000	180 100 0	000
181 100 0	000	182 100 0	000	183 100 0	000	184 100 0	000
185 100 0	000	186 100 0	000	187 100 0	000	188 100 0	000
189 100 0	000	190 100 0	000	191 100 0	000	192 100 0	000
193 100 0	000	194 100 0	000	195 100 0	000	196 100 0	000
197 100 0	000	198 100 0	000	199 100 0	000	200 100 0	000

cassette label 'control' only, and contains an example of proportional printing (the telephone number line).

This may all make the mysteries (and frustrations) of an Epson or Epson compatible printer look much more complicated than ever, but once you have had a play, I am sure that you will find the basic program and crib sheets useful acquisition!

Figure 1 is of particular use for so-

ving the old command direct from the keyboard. For instance, to LIST the program in emulated print for submission with this article, I simply typed in PRINT A:2:CHRS(27):CHRS(100):CHRS(100) (ENTER) (then PRINT A:2:CHRS(27):CHRS(100):CHRS(100) (ENTER). The permutations for use 'x' are important, otherwise the command sequence will not be recognised.

DRAGON FORTH

Brian Cudge traces the history of FORTH and reviews the NDUG package

It is perhaps more accurate to describe FORTH as a programming environment, rather than a strict programming language. It exists in the two opposing states at once — that of compiler and interpreter.

FORTH was first conceived in 1967 by Charles Moore at the Stanford Linear Accelerator Centre. It evolved from work he was doing using an IBM 7000 series (the first fully interactive computers). The FORTH interpreter was written in the ALGOL programming language, and the compiler in FORTRAN.

Moore saw his invention as a fourth-generation computer language and so named it FORTH. However, the IBM 7000 series was strictly allowed to have up to 26 characters, so the name got shortened to FORTH, and it stuck.

A completed FORTH programming language appeared in 1970, at the National Radio Astronomy Observatory (NRAO) in Arizona. Over the next three years, Moore continued to develop FORTH at NRAO, and in 1973 the demand for FORTH from other astronomers persuaded him and several others to leave NRAO and set up FORTH Incorporated.

By 1975, FORTH had developed into a general purpose programming language, and another group had been formed for interested programmers and users called the FORTH Interest Group (FIG). In 1976, the committee of the International Astronomical Union adopted FORTH as the standard programming language for astronomy.

In 1979 Moore estimated that there were now over 1000 FORTH programmers, and that the number was doubling at least every year. Since the introduction of mass market microcomputers, the number of FORTH users has grown exponentially.

Dialects

As with so many programming languages, there are a number of different 'dialects' of FORTH available. The main standards are those of FORTH Incorporated (FORTH-76), and the FORTH Interest Group (FIG-FORTH). The FORTH-76 standard has recently been updated to the form of the FORTH-83 standard. Most of the functions available in the two main standards are identical, the differences being in the names chosen for the commands. Hence a program written for one standard can usually quickly be converted for use in another.

FIG now claim that a version of FORTH is available for just about every control-processing unit in existence. For example, the 8080, 8086, 286, 6800, 6809, 6802, 6803, 8086, 28080 and 68090, are just some of the more popular than 16 bit CPUs for which FORTH is available. The popularity of FORTH on smaller computers is due to

a number of factors, which were then not common to all programming languages.

The main attraction of FORTH is its speed, indeed one of the main design aims of FORTH was rapid program execution as it was developed for real-time applications such as controlling telescopes. FORTH is just about as close as one can get to the programming speed of assembler, while staying within an interactive programming language (rather than a compiler).

Structure

As FORTH was intended for use on dedicated computers, the system is very compact, most implementations use only about 8-16k of memory. The trade-off comes with the lack of any floating-point and sophisticated file handling. These can, however, be added if required, as another attribute of FORTH is its extensibility. Another price to be paid for FORTH's speed is its lack of error trapping. A 'bug' in a program can cause the whole system to crash, so careful step by step testing of code is essential.

The FORTH language is unlike most other languages. Its structure is quite different from BASIC, COBOL or C. It is neither an interpreter nor a compiler, yet it can be either or both at the same time.

A command can be typed at the keyboard, and FORTH will interpret it and execute the required action immediately, thus acting as an interpreter (as with Dragon-Basic). Conversely, definitions may be entered for FORTH to convert to internal code, to be executed at a later date, hence acting as a compiler.

When developing a program, it is useful to be able to try out sections of code independently and interactively, to 'fine tune' the code, this is the main justification for interpreters. However, the finished program should run as fast and efficiently as possible, hence the justification for compilers. FORTH is an attempt to be the best of both worlds by being a semi-compiled language with an interpreter.

One of the main features that distinguish so-called high-level languages is whether or not the language is structured. Good 'nested' structures are essential for clear, efficient programming. Such languages as BASIC, COBOL, and FORTRAN lack many of these control structures, yet FORTH, like BASIC, offers all the standard ones such as BEGIN — WHILE — REPEAT. Unlike BASIC, FORTH allows the user to create their own control and data structures.

FORTH is very much a 'bottom-up' design language. It appears difficult to understand on first sight, but once the basics are understood, programming in FORTH becomes easier and easier. Words defined

for use at a low level in one application can often be used within other programs, making programming more efficient in the long term.

Programs written in FORTH are often easier to debug than programs written in other languages. Changes may be made at any level within a program without having to modify the whole program. However, the lack of any error trapping and post-mortem information is a drawback here.

Current applications of the FORTH language still include its use in real-time control. For example, 'Glican Inc' used FORTH to control camera systems used for filming special effects in 'Star Wars', and 'Magican Inc' used a similar system in the 'Star Trek' series of films.

Many of the latest video arcade games produced by Atari were written in a specialised version of the language called GameFORTH. The Cedar Sinai Medical Centre in Los Angeles uses a multitasking version of FORTH to control its data processing applications.

Languages with structures similar to FORTH are correctly known as Threaded Interpretive Languages. Since the introduction of FORTH, a number of spin off languages have appeared. These have mainly been specialised versions of FORTH and have not generally gained much support. Examples of such languages are STCOL, IP3 and P3COL.

Stack orientated

There are a number of versions of FORTH available for the Dragon computer. One of the latest, and the one I used for this article, is from the National Dragon Users Group. This version seems to be based on the FIG standard with some changes to make it easier to use on the Dragon. I will look at the special features of this particular version in a moment, but firstly a very brief overview of programming in FORTH.

FORTH is an entirely stack orientated language. A stack is simply a last-in, first-out buffer containing, in this case, integer values. FORTH maintains two stacks, known as the parameter and return stacks. The parameter stack is used by the programmer to pass values between commands, and to obtain results. FORTH operates with Reverse Polish Notation (RPN) on all of its arithmetical and logical operations.

Briefly, RPN can be explained as follows. The normal way of writing down an expression such as 3+3 is technically known as infix. The infix method is used by almost all pocket calculators and most programming languages (including BASIC). It is the most straight forward and natural form of expression for humans, but for computers it is not

The equivalent of 'info' for computers is RPN. The expression above would be written in RPN as $3\ 3 + +$. In other words, the two operands of an expression are typed first, followed by the operator. As a further example, consider the info expression $3+7*8$; it is not clear if the result required is $(3+7)*8$ or $3+(7*8)$. This ambiguity is not present in RPN; the expressions become obvious — $3\ 7 * +$ and $3\ 7 * + 8$. Hence in RPN there is no need for complicated bracketed expressions.

Forth commands are called words and are executed sequentially as typed.

For example, the Forth word ' \downarrow ' takes two numbers from the top of the parameter stack, adds them, and leaves the result back on the parameter stack, and the word ' \uparrow ' leaves the top value on the stack to be displayed. Hence entering $3\ 4\ \downarrow\ \uparrow$ would result in FORTH responding 14 OK.

FORTH programs are built up of lists of words. For example, to make a telephone call requires the following actions to be carried out:

LIFT-RECEIVER-WAIT-FOR-TONE-DIAL-NUMBER-WAIT-FOR-REPLY

and so on. Actions such as DIAL-NUMBER can be further subdivided as follows:

PLACE-FINGER-IN-HOLE-RELEASE-HOLE-TURN-DIAL-RELEASE-DIAL

To write a FORTH program to make a phone call would first of all involve constructing words to carry out the basic tasks, such as 'TURN-DIAL'. These are defined in terms of the predefined FORTH words (of which ' \downarrow ' is an example). Once these have been written, the next level of words can be defined in terms of these basic constructs (words such as 'DIAL-NUMBER'), and finally a single word, for example 'MAKE-CALL', could be defined to carry out the whole task of making the call.

FORTH words are stored in a dictionary, and within this dictionary there may be several vocabularies. A vocabulary will simply contain words which are in some way connected or similar. It is up to the programmer as to within which vocabulary a word will be stored. There are two vocabularies predefined, called 'FORNTH' which contains most of the predefined words, and 'EDITOR' which contains words to edit FORTH programs on disc.

Return stack

Hence FORTH is often an ideal language for tasks that can be broken down into simpler and simpler constituent parts. The FORTH system is acting as an interpreter when instructions are executed immediately after being typed (as in the example for instructions are stored as new definitions (new words) to be executed later, perhaps as part of another word.

With the ability to call words within words to any reasonable degree, FORTH obviously needs some method of keeping track as to where it is within a program. For this it uses the return stack. Whenever execution of a new word starts, the position from where that word was called within another

word is put onto the return stack. This value is held in a FORTH variable known as the instruction pointer (as it points to the next instruction to be executed). Once its value has been put onto the stack, the location of the new word is loaded into it and execution continues from there. When the word finishes, FORTH knows where to continue from by taking the value from the top of the return stack and loading it into the instruction pointer (this is similar to the operation of the CPU itself).

The FORTH system also uses this stack for internal use when compiling constructs such as loops, and conditional clauses. Often, the programmer will not be concerned with the return stack at all as all user information is passed via the parameter stack.

The version of FORTH available from the Dragon User Group contains a number of extra goodies in addition to those required for the standard. The system is loaded via the BOOT command (in DragonDOS) or simply switching on the computer (DataDisk). Once the language is ready, you can load in some extra commands from the disc. These are saved as FORTH screens on the disc in their source form so you can have a look at them if you want. The most useful one is a 51 column screen driver and screen editor word processor. You can also switch to an 85 character line display which can be useful for seeing how printed documents will look on screen. This mode is quite readable on a monitor but rather hard on a normal colour television.

A standard FORTH screen is made up of 16 lines of 64 characters (10), but it would be difficult to edit on the Dragon's screen, so NUOG FORTH uses a screen stack size of 256 characters (one disc sector) which means a whole FORTH screen can be edited on a screen at once.

In addition to the word processor type editor, NUOG FORTH also comes complete with a Turtle Graphics extension. This seems to be quite well implemented and does not suffer from the usual deathly slow reaction speeds of Turtle graphics. Demonstration screens of the editor and turtle graphics can also be loaded from the disc.

A very useful word is 'B' used to call Dragon Basic commands (in the Basic ROM), for example, to set the screen mode you can use B (PMODE) / SCREENPLUS. Hence all of the Dragon's graphics and sound features are fully available to NUOG FORTH programs. In addition, functions such as estimate box drawing and GETINPUT functions are implemented directly in FORTH which means they run even faster (theoretically) than in BASIC.

The manual I have is only a pre-production draft, but somewhat written and straight forward. It does not, however, attempt to teach you how to program in FORTH for that I suggest you take a look at some of the books mentioned below. If you're interested in using this fascinating language on your Dragon then NUOG FORTH is highly recommended.

System Used: NUOG FORTH (Dragon-Disk or DataDisk).

Price: £175 (inc. P+P).

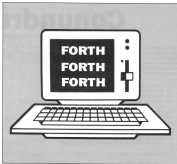
Supplier: NUOG, 61 Naverim Road, Woking, Surrey (Tel: Woking 537565).

Forth Books: Starting FORTH by L. Brodie, FORTH Reborn by Olney and Benson.

Steeper FORTH by Hogan.

FORTH Tools & Applications by Poirbach.

The Complete FORTH by Welfield.



Conundrum

R Andrews puzzles on with words and letters

This is a game in which two players in turn can try to guess a randomly chosen anagram within a time limit of thirty seconds. Their score is calculated from the time taken, and this goes on until one player reaches a score of 200 points.

To start, or continue after a guess, simply press the space bar. When you think you have guessed the conundrum, press the space bar again and input your answer.

Variables

ANS Anagram string

DWD Randomly picked word
P Player to go

SA Player A's score

SB Player B's score

L Length of anagram

D Position of letter in anagram

```

10 'Set up timer and set up screen
20 DIM A$(100),B$(100)
30 P=1:SA=0:SB=0
40 CLS:PRINTSTR$(CHR$(122),129); "          CONUNDRUM          "
50 PRINT:STR$(144,STR$(64,129));PRINTSTR$(72,CHR$(129)); "          "
60 PRINTSTR$(64,STR$(64,129));PRINTSTR$(72,CHR$(129)); "          "
70 PRINTSTR$(64,STR$(64,129));PRINTSTR$(72,CHR$(129)); "          "
80 FOR A=129 TO 450 STEP 32:PRINTA$; "          "
90 PRINTB$A$,CHR$(124);PRINTB$B$,CHR$(125);PRINTB$22$,CHR$(123);CHR$(123)
100 PRINTB$56,CHR$(127);CHR$(124);PRINTB$116,CHR$(122);CHR$(122);PRINTB$
110 PRINTB$70,"SECRET";PRINTB$112,"SCORE";
120 PRINTB$117,"YOUR GO!";
130 'Main loop
140 GOSUB 200
150 GOSUB 250
160 PRINTB$22,SA;PRINTB$44,SB;
170 GOSUB 350
180 GOSUB 440
190 GOTO 190
200 FOR A=1 TO 10
210 DIM A$(100)
220 IF A=1 THEN GOTO 250
230 FOR A=1 TO A-1
240 IF A$(1)=A$(1) THEN GOTO 210 ELSE NEXT A
250 NEXT A
260 RETURN
270 'Set up anagram
280 IF P=1 THEN A=150/20+RND(120)+RND(120)
290 IF P=2 THEN A=150/20+RND(140)+RND(110)
300 RESTORE
310 FOR B=1 TO A:READ C:NEXT B
320 B=LEN C$
330 FOR C=1 TO B
340 A$(C)=MID$(C$,B+C,1)
350 NEXT C
360 RESTORE
370 RETURN
380 A$=(A$(1) IF A$="" THEN 380 ELSE 290
390 FOR P=1 TO 10
400 PRINTB$70+A$,A$(P);
410 NEXT
420 RETURN
430 'Timer
440 T=0
450 FOR I=0 TO 1 STEP .1
460 T=TIMER
470 PRINTB$74,T;
480 A$=INKEY$:IF A$="" THEN PLAY"O8P":GOTO 440
490 PLAY"TLN10P8DVCVCVC25"
500 IF TIMER>50 THEN GOTO 310 ELSE 480

```

```

810 T=T+1:GOTO 500
820 PLAY"V2V"
830 PLAY"V3V3V"
840 GOTO 440
850 PRINT#427,000;
860 "Where's player for word"
870 IF K=6 THEN PLAY"10000"
880 IF P=1 THEN P=2 ELSE P=1
890 A$=INKEY$:IF A$="" THEN 870 ELSE 400
900 IF P=1 THEN PRINT#417,"YOUR 50:";PRINT#429," "
910 IF P=2 THEN PRINT#417," " "PRINT#429,"YOUR 50:"
920 PRINT#299," "
930 PRINT#427," "
940 GOTO 150
950 GOTO 450
960 SOUND 50,1: SOUND 30,1
970 "Input word sequence"
980 IF P=1 THEN PRINT#417," HELLO " " ELSE PRINT#429," HELLO "
990 A$=27:FOR A=1 TO 1
100 PRINT#4,CHR$(126);
110 A$=INKEY$:IF A$="" THEN 110
120 IF A$=CHR$(8) THEN PRINT#4," " :GOTO 1000
130 PRINT#4,A$;A$=A$+1:GOTO 990:IF A$=126 THEN 110
140 PRINT#427,CHR$(126);CHR$(126);PRINT#447,CHR$(126);
150 FOR A=1 TO 10:IF A$()=CHR$(126),3,1 THEN A$=1:GOTO 1
160 IF K=6 AND P=1 THEN A$=A$+1
170 IF K=6 AND P=2 THEN A$=A$-1
180 K=0:IF K=6 THEN PLAY"12000000"
190 IF A$=000 OR A$=000 THEN GOTO 910
999 GOTO 550
910 REM Data
920 DATA IRELAND, IRELAND, SCOTLAND, WALES, ALBANIA, ALGERIA, AUSTRIA, BELGIUM,
BOLIVIA, BRAZIL, BULGARIA, BURMA, CANADA, CEYLON, CHILE, CHINA, COLOMBIA, CUBA, CY-
PRUS, DENMARK, ECUADOR, EGYPT, ETHIOPIA, FINLAND, FRANCE, GERMANY, GHAANA, GREECE,
HUNGARY, ICELAND
930 DATA INDIA, IRAN, ISRAEL, ITALY, JAMAICA, JAPAN, JORDAN, KOREA, LIBANON,
MALTA, MEXICO, MOROCCO, HOLLAND, ROSSERIA, NORWAY, PAKISTAN, PARAGUAY, PERU, POLA-
ND, PORTUGAL, RUSSIA, SWEDEN, THAILAND, TONGA, TRINIDAD, TUNISIA, TURKEY,
URUGUAY, VATICAN, VIETNAM, ZAMBIA
940 DATA KABUL, TIRANE, VIENNA, BRUSSELS, BRASILIA, TORONTO, PEKING, PRAGUE, CAI-
RO, LONDON, HELSINKI, PARIS, ROM, BERLIN, ATHENS, BUDAPEST, DUBLIN, BAGDAD, TEHRAN,
SUKHIN, MOSE, KINGSTON, TOKYO, SEOUL, YAOZU, AUCKLAND, CHICAGO, LIMA, WASHINGTON, LISBON, MADRID, BERNE, MOSCOW, CARDIFF
950 DATA AMSTERDAM, SUDBURY
960 DATA ABERDEEN, BELFAST, LEEDS, BRISTOL, PLYMOUTH, CORN LILLE, CALAIS, SOUL-
HAY, OLEANS, MONTECARLO, NICE, MONACO, BOSTON, LONDON, ANTWERP, ESSEN, COLOGNE, MUNICH,
HAMBURG, BREMEN, AACHEN, SALZBURG, ZURICH, GENEVA, BILBAO, BARCELONA, VALENCIA, MILAN, NAPLES, TURIN, BOLOGNA, VENICE
970 DATA GENEVE, LEIPZIG, HALKO, KIEV, COSSA, ANKARA, SOFIA, DRAKULAS, TRIPOLI,
DENVER, DALLAS, HOUSTON, MIAMI, BOSTON, CHICAGO, DETROIT, SEATTLE
980 DATA ELSTER, TORREY, NEWPORT, BRISTON, HASTINGS, DOVER, MARGATE, TALTON,
RINCHARD, BRIDON, READING, LUTON, OXFORD, IPSWICH, NARWICH, BANBURY, NORWICH, ST
AFFORD, DORSET, BOSTON, BIRMINGHAM, LONDON, CREWE, CHESTER, BRADFORD, HALL, YORK, WHITBY, BURHAM, NICHOL, KESWICK
990 DATA DOUGLAS, CARLISLE, HESKETH, BERNICK, PETERHEAD, DUNDEE, GLASGOW, STIRLING,
DUNDEE, PERTH, PETERHEAD, THURSO, MONMOUTH, PALLMILL, HOLTHED, CARDIFF, SWANSEA, LERWICK, BARRON
1000 "Winner position"
910 IF A$=000 THEN PRINT#22," " "PLAYER ONE HAS WON"; ELSE PRINT#22," "
"PLAYER TWO HAS WON";
920 PLAY"110000000"
930 PLAY"11111111"
940 PRINT#22,"PRESS ANY KEY FOR ANOTHER GAME";
950 A$=INKEY$:IF A$="" THEN 950 ELSE 960
960 PRINT#22," " "CONUNDRUM "
970 A$=0: B$=0: P=0
980 PRINT#22," " "PRINT#244," "
990 GOTO 600
1000 A$=INKEY$:GOTO 700

```

Winners and Losers

Every month, Gordon Lee will look at some prize programming poems from a previous month's competition

HERE WE go again — time for another pick from the postbag of entries for the September competition puzzle. The problem was to find all possible eight-digit cubes that, be defined as a digitin turn, will produce in sequence a prime, a multiple of 7, a prime, a perfect square and finally another prime.

There were two possible solutions:

```
13657819 and 163263281
1368819 13263241
136881 1326321
13681 132641
1368 13261
136 1321
```

A number of entrants suggested a third solution, even though this was a repeat of the second of the two solutions already given. This is because a second identical sequence is generated depending on which of the two leading lines is deleted first. This could not really be classed as a distinct solution.

Not detected, one reader, who to spare his blunders I won't identify, even suggested that there were four different solutions. Closer inspection revealed that his program had accepted algorithm the values 161 and 1632632, both of which are divisible by three. By examining (or testing) the fault was soon located to the 'prime check' section of the program. The method that he had adopted was to eliminate all values that were even or which ended in '5'. He then tested for divisibility by three means of the 'digital root' method. That is, if the sum of the digits of a number is divisible by three, then the number is also divisible by three. Having put the number to be tested into string A\$, he used the following routine:

```
SUM = 0
FOR A3=3 TO LEN(A$)
SUM = SUM+VAL(MID$(A$,A3,1))
NEXT A3
```

The error, for there are two of them, are to be found in the third line which should have been:

```
SUM = SUM+VAL(MID$(A$,A3,1))
```

I will leave readers to work out for themselves the important differences, but this is a case in point where, perhaps due to a moment's inattention, a simple but vitally important error can creep in. On the whole it would have been simpler (and quicker) to use the single line test:

```
IF A3 = INT(A3) THEN ...
```

The testing for primes was the aspect of the competition which gave the most difficulty — an aspect which Phil Baggett (aka *baggett*) describes as a 'bit of a drag'. Well, Phil, I bet you did! I find it much of a drag as Aslan Henderson at Bromsgrove, whose listing includes all primes up to 3163 typed in by hand (presumably from a table of primes).

Many entrants adopted all manner of exotic tests for primality. That they worked I don't doubt, but are they any quicker than a straightforward prime test? I don't know.

To return to basics, a prime number is one that does not have any whole number factors except itself and one. Therefore, if a number under test is tested by a series of trial divisions to primality, or otherwise, can be established. The method is simple, but repetitious, and this is where the computer can help us. Fortunately, there are a number of other considerations which can help. For example, it is only necessary to use trial divisors up to the square root of the number under test. Clearly, if any factors exist they will occur in pairs, one factor less than the square root, and the other greater (unless, of course, the number is a perfect square, in which case both factors would be the same). It is also only necessary to divide by prime numbers, although, at a pinch, dividing by two, and then all odd numbers will do almost as well.

The array with the first two primes, those values being used to generate subsequent values in the series. Thus the array becomes self-generating. The variable *Prime* is the number being tested, and the variable *S* is the subscript of the array which is waiting to be filled. Once the array is complete, the program passes on to line 160. Here would be the main body of the program. To test a number to determine if it is prime it is only necessary to define that number as *N*, and then to *DOUB* *DOUB*. If the flag (*FL*) is returned as zero then the number is prime; if it is returned as 1 then a factor has been found. Note that in both of these listings if a factor is found and the flag is set to 1, the search ends immediately to speeding up the test — an important consideration where there are many numbers to be tested. The reason for adding 5 to the value of *DOUB* in lines 1620 and 1618 is to overcome the slight inaccuracy which sometimes occurs with this command.

The rest of the competition program was

Listing A

```
1000 INPUT N$;FL=0
1010 IF NOT(OR(LEN(N$)>10,VAL(N$)<1,NOT(FL=0),NOT(FL=0),NOT(FL=0)))
1020 FOR P=2 TO SQR(N)+.5 STEP 2
1030 IF VAL(N)/P=INT(N/P) THEN FL=1:GOTO 1050
1040 NEXT P
1050 IF FL=0 THEN PRINT "PRIME" ELSE PRINT "COMPOSITE"
```

Listing B

```
10 DIM P(444)
20 P(1)=2:P(2)=3:P(3)=5:P(4)=7
30 GOSUB 5000
40 IF FL=0 THEN FOR P(5)=11:STEP 2:FL=1:GOTO 10
50 IF P(444)=1000 THEN GOTO 60:PRINT "END OF PROGRAM HERE"
6000 RETURN
5010 REM Prime Test Subroutine
5020 FL=0:FOR I=50001 TO 51500
5030 IF P(I)/N=INT(P(I)/N) THEN FL=1:GOTO 5050
5040 NEXT I
5050 RETURN
```

These methods are reflected in the two listings given, one simple but slower, the other a bit more complex, but, once the initial array of test primes has been generated, a method that is a bit quicker.

In listing A, the number under test (*N*) is divided first by 2 to reject it if it is even, and then by a sequence of ascending odd numbers. If a factor is found the flag (*FL*) is reset to 1 and the test ends. This listing would probably be adequate where only a few numbers need to be tested, or if the numbers under test are comparatively small. For larger numbers, or where many numbers need to be tested, then listing B would probably be the most efficient.

In this program the array *P(444)* is used to store the values of all primes in the range 2 to 3452. If you didn't know that there were 444 numbers in the list by checking the table of primes, then you could always make an estimate for the size of the array (subject, of course, to the memory available). Line 20 in the program 'loads'

quite straightforward, almost all competitors adopting what Robin Tolson of Sale describes as a 'top down' approach. That is, starting with the eight digit cube (values of numbers in the range 245 to 444) each digit is deleted in turn and only if the resulting value passes the primality test, is the value tested further. If the sequence finishes with a three-digit prime, then the test has been completed and the relevant values can be printed out.

With regard to increasing the speed of execution of the program several entrants used the speed pole, and Robin Tolson also suggests keeping the frequently used numbers near the beginning of the program (ie with low line numbers). And finally this month I'd like to mention Jonathan Hargrove of Warrage, for he not only offers that his complaints that we always spell his name wrong, (and he mean Jonathan Hymie of Warrage) Sorry, Jim ... 551) Well, I hope we've got it right this time! Cheers for now, and keep those entries coming in.

Expert's Arcade Arena

Write to "The Expert" at Dragon User
12-13 Little Newport St, London WC2H 7PP.
with all your arcade tips and tricks.

GREETINGS, Gamers. Here are the maps! Firstly, a big thank you to everyone who has sent maps in — but a plea, too. The Great One pleading! Please send in maps as clearly and accurately as you can do them. I would advise the use of graph paper where distance is relevant, but this makes the need for bold drawings in black ink even more necessary. Avoid pencil if you can, or use a strong black pencil.

So, to the maps. Firstly, a Brock's Kingdom map (at last, thank you) from R Scott, of North Yorkshire. This is a good map, clear, concise and to the point. Which leads me rather neatly into Castle of Doom, and another important thing about maps: if you don't put your name on them — that means on the actual map, not in a separate letter — they tend to end up appearing in my office, and you won't get to see your name in lights, or, at least, in black and white. I haven't ever played Castle of Doom so I can't really say how useful this map will be. The test map, however, ideas with my own fair hands and will be very useful to people playing the arcade adventure Targemwood from Microdeal. The reason the top left hand corner is left blank is so as not to spoil the surprise when you get past the giants. Now, while we're on the subject of Targemwood, how about maps of Dwarf Dive and Castle Sorcery from some of you?? Eh?

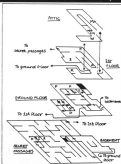
So to the Wizard's Quest map. This map presents a lesson in the "I seemed like a good idea at the time" school of map making. No name on it either. Puff said?

Lastly, Graham Rice's map of stages two and three of Castle Smash...and don't bother sending in maps of the latter sections as I've got them and I'm going public in two months. "But...but... Why? Why not next month?" Because next month is the "Expert's Games Round Up!" and, also, an answer at last (well, an answer of sorts) to the question "Who is the Expert?" will be answered, complete with photo and CV.

How can you wait? I know, this brings new meaning to the word "arjact". And that's something some of you understand, you greeting bunch of geeks.

Editor's Note: We looked at the maps and decided that any attempt at re-drawing would simply further any confusion. One notable exception was the Expert's Targemwood, which not only avoided the Expert's advice about strong black lines, but overtook the essential fact that, in black and white printing, red comes out black, and blue (especially that pretty turquoise blue, Cok) comes out invisible.

The actually-placed splash of blood in the corner of Brock's Kingdom turned out to be out of line with the letter's looky bits. Snowpale is the rescue — again. We hope you find these guides useful.

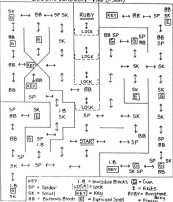


WIZARD'S QUEST

KEY

- 1-Way (open)
- 2-Way (open)
- 3-Way (open)
- 4-Way (open)
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- 6-Way (open)
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- 99-Way (open)
- 100-Way (open)

BROCK'S KINGDOM - MAP (1/2 View)



CASTLE OF DOOM



GROUND FLOOR

See book
page 15

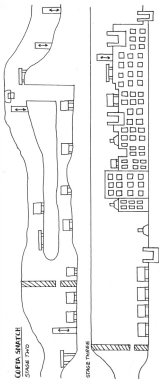


FIRST FLOOR



SECOND FLOOR

CAPIA SKETCH ZONE TWO



BY THE WAY: THERE ARE TWO MORE SKETCHES OF THE CASTLE.

Speech recognition

Ziv Eliaz teaches his Dragon to come when he calls

This program will enable your Dragon to understand and identify human speech, music, or any other sound you can make, based on software and your tape.

You control it using new commands which are patched onto the existing Basic. This is a great tool for the handicapped, as irregularly ill or injured can use to control it. Hooking up is fairly easy (see figure 1), but the program won't work on every tape. You must have a tape that outputs to the speaker (ie CAR jack) whatever is inputted through the MIC (I use Discos TR10). You can see if your tape is suitable by connecting the microphone, talking with the RADIO CAR, and seeing if the TV amplifies whatever you say. Another good use for this program is passing information from computer to computer using whatever sound commands one computer has, to the Dragon without any hardware connections (you can pass graphics, screens, data, etc.). If you have a speech module attached to the other computer, you can even have it speak to the Dragon.

The commands added are these:

1) WORDSET place, words:

You must have this command at the beginning of every program, so the program will know where in the memory to put the coded words. Since every word takes 100 bytes (changeable), the initial place in the memory will be place *100+4500.

Words is the number of words you plan to include in this part of the memory. To protect this area from being overwritten by Basic, you should:

10 CLEAR whatever; place *100+4500.

Word-number 1 is used by the system, so (see) words will take 300 bytes. DRAG00, RECEIVED, and AVERAGED will result in an error.

2) ENASE word:

Clears the memory occupied before by a word. This should be done before first RECEIVING or the understanding process will not work well.

3) RECEIVE word:

Translates sounds from the cassette to the memory. Default size is 100 bytes, which will allow about one word, depending on the sounds you say. Sounds like 's' or 't' take a lot of space (and are thus easily identified while 'i' or 'e' are very short and hard to tell apart). You'll have to say 'bean' and 'tear' VERY clearly so that the Dragon can tell them apart — but then again, what was the last program you wrote using 'bean' and 'tear'?

Rarely does the word we say fit in exactly 100 bytes. If it is longer, or has many 'ts', the system will return to Basic automatically if you have finished saying your word and there is still more time. Have the joystick handy and press the fire button. This will return you to Basic. (Up or Down are examples of such words). If you don't have one, say the word and a long 'tear' afterwards.

4) AVERAGE word:

Since we can't always say the same word in exactly the same way, it is always good to average any word said by RECEIVE or AVERAGE =. By doing so it's much more likely that the word said again later will be understood.

5) MATCH:

After all the words you have said in the memory MATCH will ask for yet another word and then return to basic.

There are also two functions to know the word said and its quality:

1) WORDSaid:

Returns the number of the word that has been said (for example: MATCHPRINT WORDSaid).

2) PENALTY:

PENALTY returns the high byte of the penalty points for the word you said. If PRINT PENALTY returns 0, it means you were pretty close to saying the word exactly as the first time, and it's almost certain that that was the word you said. If it returns more than 4 or 5 it means you probably said a word not RECEIVED, and that WORDSaid is the word which sounds most like it.

Tips

Say the word as you like, but when you repeat it, you must say it in exactly the same way. The program is also sensitive to different pitches, so while it will understand you, it won't understand anyone else. This does have its advantages though — you can hum, sing or whistle your favourite tune, and have it repeated.

The program works best in total silence and best results are achieved under those circumstances (no, you can't listen to Iron Maiden's latest hit and be understood).

Divide your words into subjects. For example, have one place which will include YES and NO, then another for UP, DOWN, LEFT, RIGHT, SWOOSH and use the different areas in the memory for different subjects in

the program. The more words you add, so grows the chance of error. (This does not apply to sounds from an electronic musical instrument, or whistling, as these have distinctive sound envelopes).

If you have a machine code routine, take control of your words conversations if it starts at 20000, don't use WORDSaid (BASIC...)!

Screaming at the program won't help. The Dragon is pretty sensitive here, and if you see that the program makes mistakes too many times for it to be reasonable, it probably means the source word is wrong. RECDONE it again.

Listings

For a speech recognition you must enter the code (listing two) with the hex loader (listing one). After you are finished, type COMMAND*DRAG00*, 2700,28400,2700 and the code will be saved. The code sits in locations 2700 to 28400, and the system uses another 1900 bytes, reaching up to 30300, so DeltaDOS users will be able to use the disc drive with the program.

Listing three is a simple program that listens to what you sing/hum/play, writes it on the screen and then lets you play the tune back by saying "PLAY" and add it with "ENASE" (the program will ask you to say these in the beginning). You will also notice that the program does not follow note lengths, this is made to ensure correct note entry. Using Listing four you can change the parameters of the program and in that way make the length of the words shorter or longer. This way the notes entered in Listing three will be much shorter, and program will follow note lengths, but the quality of recognition will fall because each note also has attack and decay values.

Listing five is a general menu driven program that demonstrates the abilities of speech recognition. It allows the user to input words, average them, see their graphs, check recognition and save them to tape.

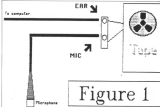


Figure 1



LET me start where I left off last month, more or less, by bringing all the clues kindly provided to questions held over in the Adventure Contact section by Guide Jongbeils of Belgium. Clues have been rather lacking lately, and I know it's something you like to see, so hold on to your Dragons and here goes...

In Return of the Ring, if you can't breathe on the Forest Moor: **SACOS LARINBO H KIAM RHTDREB YUB**. Can't find blue pass? **CHV LÉVEL TA PCHS SSAP H YUB**. What is a tracker? In Forest Moon type: **REINGARTICU**. What is the use of the glass? **BNOM**. Where is the Book of Salsut? **MOOM TEE PCH NO TERNCP OTM RELUM LLERK NET**. How to open chest in Halls? **Terncp TERNED EHT PG YEK EHT HTB**.

In Syropy, how to kill the alien: **TI DA ERUACPG YECUP WORTH**. In Quest, how to cross the river: **TACSA YUB**. In Mansion of Doom, how to get across the deep pool of acid blocking path to coffin: **TI PORD DHA KOS NEPO**. When you shoot the sword off the path down disappears: **(ERANS DHT) NAY RHTDHA YRT**.

Next, Trekkor. How do you use the Telescope? **'WOONIN OQ' EPTT DHA NOTUB SSGEP**. How do you open the access pass? **TENAL PAMORF DICANTW**. How to light the dark room? **NOTUB SSGEP DHA LEMAP SSGCA DHA** in Room of Darkness, can't find help Cube: **TI TOSMS - SSGWISNO EHT LLAM ST**.

That's enough help from Guido for the moment, and sorry it's taken a long while to appear. Guido, like the column's just been packed with other things the last few months.

Emeralds

More help on Trekkor is needed by Sir Edochelet, Room 001, Mary Dee House, 107 Radcliffe Road, Leicester LE2 3TB. He has the common problem of being unable to cross the lava stream. Find you need: **(DCA HTW ETRAD EYUOSD** and then you **RAAL REYAGEL NURU SSCOC**. He also wants help on Syropy, if there are any kind-hearted souls out there who got further with that game than I ever did. He's got the emerald but can't get past the 2nd force field or back through the 1st on the 2nd floor. **WHAT NOW?** As they say.

Both seeking and offering help is Donald Morrison, 72 Dunsington Road, Inverness, Scotland FK9 3GT. Help available to anyone needing it on El Dababro and Galiso Island

in exchange for the usual SAE, and SAE gladly sent to anyone offering help on Meddass and the Minstaur. Like how to get the torch, mushrooms, Ruko, skull, etc, sceptre etc. Little things like that.

James Bonfield has been tangled up in Zengwood, but has been able to untangle himself long enough to send us a map for use while travelling at night, so thanks for that, and I'll be passing it to the editor to see if we can perhaps reproduce it in a future issue. James says that to get Peabody back, which is all that he's yet managed to do, you first have to **EDRPSA TEG**, then you go to the garden and **SHWOLF GGD** in order to **EVGCH TEG**, then take that to Peabody's kennel and drop it. What James needs to know to proceed is how to get into Selenik's Castle, how to get the money to buy the herbs and how to get Fugleth's plumes. Help to James Bonfield, 7 Water End, Westlingworth, Sandy, Beds SG9 9DA.

Mirror

Gareth Edwards is offering help to anyone stranded in Justaposition, Time Machine, Trekkor and Space Trek 1, and for anyone who's written to Gareth before he asks me to point out that his new address is 1 Hollyhead Court, Handborough, Cambridgeshire, MK43 0JN. He would also like to hear from anyone interested in swapping adventures they've finished, and needs some help on Aqueduct 471, specifically what to do now he's got the pipe, memory grid, plant cutters, manual and mirror. Now you've got the mirror, Gareth, you can **RET-SCOP CG** and use the memory grid in **RETUPMOC XIF** and then **RETUPMOC NLR**.

Apologies are due to Pat Winstanley and any readers who were interested in subscribing to her Adventure Contact or other magazines, which I recommended in the December issue. I committed the cardinal sin of missing out the address to write to, which is 15 Hollington Way, Wigton, Lancs WN2 6US. To repeat briefly, Pat's magazines cover adventuring generally, not the Dragon in particular, but if you're at all interested in writing your own adventures then they're packed full of essential information.

A while ago I had a long (and I do mean long) letter from Richard Gorrin, 71 Oakley Drive, Wellingborough, Northants NN16 3UP, containing many other things Richard

threatens violence to the programmer who came up with The Doodledwood incident, which's presently stuck in a drawer with a Member of Parliament who keeps insisting he have another gin and tonic.

Richard offers help to anyone stuck in any of the following, and he points out that any request not accompanied by a.s.a. will be studiously ignored. Quite right too! Games solved are Syropy, Caverns of Doom, highly recommended, Trekkor, Justaposition, and Porter Factor, some being finished off with a little help from his friends. He says one of the main problems in Justaposition has always been getting the Briani emerald, and Richard's advice on this is going to be printed forever, so anyone who doesn't want to know the solution had better read the next bit with their eyes closed. First, he says, you can forget all about it till the Doodledwood have been found. To get them, get the inner tube off the wheel, insert it with the sticky tape, open the valve in a power cylinder and inflate it, enter it, go to the shaft in the Brown lands that is next to the Blue Mountains, swim the river in it, examine the skeleton and use the skeleton wall. If you can't figure out what to do next, enter the tower with the emerald in it, grab it and use the pendul.

Fear of spiders

Right, you can open your eyes again now, though better close them again quickly if you're scared of spiders, like the one found in Trekkor. To get rid of that using the Eonora method, you give it the capsule, wait till it goes to sleep, pick it up, carry it to the room containing the Xandus plant, drop it, grab the plant, leave the room, press the button twice and, hey presto, one spider-fated spider!

More for some tips on Porter Factor from the same prolific source, and Richard says this is a very devious adventure. As he's solved it, that can only make him a very devious adventurer. He says that the game contains numerous secret doors, so examine absolutely everything again and again, and yet again when you've done something weird. One problem is how to get a light, and the answer is that you have to make a candle. To do this, get the bird from the waxworks exhibit, go to 120B (the blue cartridge), melt the bird over the torches to get a ball of wax and then **MAKE CANDLE**.

Other tip: your battery needs some acid, so how about citric acid? Diamonds are

simply lumps it off coal that have been subjected to high pressures and temperatures for eons of years. Primitive tools can be played with bits of wire. And how about plying a few people (living or otherwise) with gifts? And how about making the Adventure list at least four pages long? Oh sorry, the last one was a request, not a tip. Quite a common request, too, and while it's a nice suggestion let me say that it's not simply a matter of bunging more pages into the magazine. The size and cost of your copy of Dragon User are dictated by lots of considerations, not least the amount of advertising that comes in. You can't simply make the Adventure list four pages longer by adding four pages to the magazine. That bungs up the cost of production, and would increase the cover price quite considerably. Then there are all the other readers who aren't the least bit interested in adventures, and would say that the Adventure list has four more pages, why can't the arcade section be bigger too? Commented? But don't let that stop you asking for more space, as it's nice to know you're appreciated!

A quick word about the mail I've just passed on the 1400 read, so neatly time to close, but not before mentioning a couple of letters

that are a few months old but have only just surfaced from beneath my towering pile of jiffy bags, cassettes, magazines and other Dragon paraphernalia. Joe (Hristol, 35) Anzac Avenue Street, Hamon, Maine is having trouble with Star/Space, which he thinks is brilliant, but each time the program tries to print some morning message, his keyboard freezes. Joe's, that is, not the program's. Also Salvage and Invent are always

'Out for lunch'. Joe asks if anyone's had a similar problem and found a way round it by using F0RKS or whatever.

Finally, James Bonfield of Sandy in Beds has sent me a step-by-step solution to Spryge (though not a identify-bugs guide through the action sequences, of course), and I've decided to add this to my list of free solution sheets. Well, almost free. Just for the cost of S&B. A bargain.

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Hotline — simply fill in the coupon below, stating your name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Help

Box, 12/13 Little Newport Street, London WC2H 9PP. As soon as enough entries have arrived, we will start printing them in this magazine.

Don't worry — you'll still have Adventure that is worth to go with!

Adventure

Problem

Name

Address

Communication

Problem: Has anyone a routine for a Rubik's Cube solver to get spacious? If possible the full screen if possible. My efforts are in vain.
Name: Stan Mithelmeier.
Address: 177 Victoria Road, Dartmouth, Devon TQ5 8BS.

Problem: Dumping lines screen to my Brother HPS printer using a machine code routine — I don't know how to do it. Help.
Name: Chris Waterhouse
Address: 23 Willow Crescent, Penrith, Cumbria CA10 3JG, North Africa.

Problem: Can anyone help with a screen dump to dump graphics to a Tandy printer (not a four colour plotter), preferably a DragonDOS based program.
Name: K. Smith
Address: 243 Hamble Quay Lane, Ipswich, IP1 0PE.

Problem: Does anyone want to swap games? I have 35

originalities. Send an SAE for details.

Name: R. Hamilton
Address: 31 Hocombe Road, Chisleham Road, Hants SO5 1SA.

Problem: I want to make contact with anyone using a Dragon for medical or nursing applications or study, to help me make more use of my Dragon with (april) medical diploma studies.
Name: Philip Boyd
Address: 27 Foston Road, Gosport, Hants PO12 4EP.

Problem: I am using a J. Morrison 'Speechless' silicone voice recognition device to control my Dragon. Unfortunately I cannot get the box to reproduce numbers or punctuation like commas. Can anyone suggest a program or other solution?
Name: Mr. L. J. Pedman
Address: Flat 2, No. 5 Guest Grove, Newton, Sth 203B.

Write down your problem on the coupon below (make it as brief and readable as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 9PP.

Problem

Name

Address

CLASSIFIED ADS

MORE than 25 games, software, cartridge, working transmitters, books, maps, and one broken Dragon! (if you want it) for £40 and 1st class 75p.

DELTA-DOS disk interface packages. Special limited reduction £35 (including VAT) and postage. Chequer-M 10 to — Dataplan Ltd, 18 Pershore, Hanley, Camberley, Surrey.

ANY 10 PROGRAMS from Dragon User 1985 or 1986 on cassette £4.00 incl. Stafford (025) 484444 evenings.

SOFTWARE FORTY FOUR original games including some limited language and added quest only £25.

DRAGON 32 for sale. Good as new with all books and original box — £45. Telephone 6005 75319.

FILE TRANSFER Dragon Cassettes to IBM PC-DOS disks. Sinclair D1V Map offered. £3.50. To Hugh Perlett, PO20 Blarifford House, Melbury Terrace, London NW1 6LB.

DRAGON 32 c/w single disk drive, ten blank discs, three journals, numerous books, magazines and software £208. (Bradford) (0274) 575685 evenings only.

DRAGON 32 upgraded 64K memory (three journals) cassette recorder books maps £145.50. **FIFTY NAME** £1. **DATAPLAN LIGHTHOUSE** Dragon software £100 plus £480 51425.

WANTED! 64K Dragon working and as cheap as possible. Name: Richard Ball. Address: 78 Sumpston Road, Potterspool, Swent NP4 5LN.

WANTED Dragon disk drive plus Dragon DOS input working order £80 to £100 0232 242299.

DEKODING printer C/P 1004 Sanyo display monitor £45 "Telewriter" cassette version £25.01 comp. cassettes 24 £5. Tel 0202 434251 even.

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Get your computer to make money. Get your 1600-40 a four-wheel income. Full and online opportunities. £1000-10000 investment needed. High earnings. Some require computer experience and sales ability. Write for free details.

Week Promotions

1st prize £1000. 2nd £500. 3rd £250.

JOYCEITS

For Dragon/Amiga. Fully interactive. Available for Amiga and other computers. £1000-10000 investment needed. High earnings. Some require computer experience and sales ability. Write for free details.

The Answer

After each game the score is data is printed out, and the complete game reviewed.

```

10 REM See an array in use.
20 FOR B=0 TO 1000
30 REM Randomize LOSE=0
40 REM First throw
50 FOR P=1 TO 6
60 DOCE=0:FOR I=0 TO 6
70 NEXT I
80 REM
90 REM Count how many of each value thrown
100 FOR P=1 TO 6:FOR I=0 TO 6
110 FOR P=1 TO 6:DOCE=DOCE+IF SC(1)=SC(2)=I THEN 1
120 NEXT I
130 REM
140 IF DOCE=0 THEN PRINT "No doubles"
150 NEXT P
160 REM Check for win
170 IF 6=DOCE THEN
180 REM Roll 5 throws
190 FOR T=0 TO 4
200 REM Randomize LOSE=0
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220 DOCE=0:FOR I=0 TO 6
230 NEXT I
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1040 IF DOCE=0 THEN PRINT "No doubles"
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3120 NEXT I
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3180 REM Roll 5 throws
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3210 FOR P=1 TO 6
3220 DOCE=0:FOR I=0 TO 6
3230 NEXT I
3240 REM Count how many of each value thrown
3250 FOR P=1 TO 6:FOR I=0 TO 6
3260 FOR P=1 TO 6:DOCE=DOCE+IF SC(1)=SC(2)=I THEN 1
3270 NEXT I
3280 REM
3290 IF
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Please enter my annual subscription to **Popular Computing Weekly** at **\$19.00 U.S. (\$38.00 Canada)**, and send my free game as marked below.

[illegible]

Figure 1 consists of four bar charts arranged in a 2x2 grid. Each chart represents a different level of agreement with the statement 'The government should do more to help people who are struggling financially'. The y-axis for all charts is 'Percentage of respondents' ranging from 0 to 100. The x-axis for each chart is 'Percentage of respondents' ranging from 0 to 100. The four charts are labeled: 'Strongly agree', 'Disagree', 'Don't know', and 'Strongly disagree'. Each chart shows the distribution of responses for each level of agreement. For example, in the 'Strongly agree' chart, the 'Strongly agree' bar is at 100%, while the other bars are at 0%.

References

Pharmaceutical companies may have a commercial interest in the

1000

11

Return this form together with your payment to: **ECDF (State), 12-13 Little Weymouth Dr., London W10 3BP, United Kingdom** for delivery.

Going straight

Gordon Lee has a word for everything — but not for his prime objective

RECREATIONAL mathematics, like computing, has its own vocabulary of terms, the understanding of which is essential when discussing some of the topics which appear on these pages. To have to explain each term each time that it is used would be rather a tedious and lengthy process, so beginning this month is a glossary of some of the more commonly used terms. This should form a useful reference in conjunction with future competitions.

Aliquot divisors. The aliquot divisors of a number are its whole number divisors including 1 but excluding the number itself. For example, the aliquot divisors of 12 are 1, 2, 3, 4 and 6.

Alphanumeric. A particular type of cryptarithm (qv) in which the letters which are substituted for digits form words or phrases. Probably the most well known is SEND + MORE = MONEY (1957 + 1085 = 10632). The term alphanumeric was first coined in 1985 by the puzzler J. A. H. Hunter.

Amicable numbers. A pair of integers, the sum of the aliquot divisors of each being equal to the other. The smallest pair is 220 and 284. Amicable triplets and larger chains also exist.

Automorphic numbers. An integer that is not prime (qv), whose composite number can be reduced to a unique set of prime factors.

Cryptarithms. Puzzles in which letters or symbols are substituted for the digits in an arithmetical expression. Ideally, a cryptarithm should have a unique solution. In a cryptarithm, identical letters represent the same digit throughout, and leading zeros (i.e. numbers having a zero at the left hand end, are not allowed. Unless otherwise stated, these puzzles are in the decimal system. Alphanumeric (qv) are a particular type of cryptarithm.

Cube. (See Hexahedron).

Cyclic numbers. An integer of n digits, which when multiplied by a value from 1 to n will contain the same digits as the original number in the same cyclic order. The smallest cyclic number is 142857. For example, $142857 \times 5 = 714285$. All cyclic numbers are the periods of recurring decimals of the reciprocals of some prime numbers. The example given is that of the prime 7. The next largest prime that produces a cyclic number is 17.

Denary. Numerical notation to base 10. This is our familiar method of expressing numbers using ten digits, decimal notation, a system also known as 'base 10'.

Digit. One of the individual symbols used to express quantities. The number 158 is written with the digits 1, 5 and 8.

Digital root. The digital root (or DR) of a number is obtained by adding together the digits of that number until a single digit remains. For example, the DR of 1073459 is $1+0+7+3+4+5+9 = 32 = 3+2 = 5$. Digital roots can provide useful negative

checks. For instance, all perfect squares have DRs of either 1, 4, 7 or 9, so we would know that the number quoted above could not be a perfect square, without having to work it out. Probably the best known property of digital roots is as a test for divisibility by either 3 or 9: if the DR of a number is divisible by 3 (or 9) then the number itself is also exactly divisible.

To be continued next month.

THE competition this month is a fill in the grid shown with digits so that it contains as many prime numbers as possible. This is similar to the familiar 'word search' puzzles found in magazines, except that here we are dealing with numbers and not words.

The numbers can read in any direction — up, down, left to right, right to left, or diagonally but of course only in a straight line. The turning of corners is not permitted. For example, the sequence 6789 would contain the primes 67, 71, 73 and 7989 is only diagonal and the prime 17 is reverse, as well as the single digit primes 1 and 3 (3 is allowed as a prime here).

However, when counting your total score each prime can only be counted once, even though it may appear in the grid several times.



To enter the competition copy your completed grid onto a sheet of paper, and then list clearly all the different primes that the grid contains.

At the top of the page state the number of primes that you are claiming.

Please check your results carefully as any incorrect entries will be automatically disqualified.

Reference to Winners and Losers this month may be useful.

The winners will be the entrants with the highest scores.

Prize

AS WE have heard, Blasty Computer Games are launching out of new Dragon software launches, unable to meet the high development costs any longer. But they are not dropping out of the market, alive, and will go on supplying games from their back catalogue to anyone who asks. This month we have 26 copies of Orbis our favourite Ruby Rodica for the brilliant among you.



Rules

Read Gordon's golden prose with an empyrion and attention, all entrants for second half hours, each at an event program on your Dragon to unravel the solutions in an instant, print out the program and any notes you want to include, and send it post haste through the winter snow to our door. No casualties this time, thank you, we have enough.

Right, and for the breaker this month, complete the meter: 1987 will be the year of the Dragon, because... Come on, about it, someone might hear us.

November winners

The winners of Miranda's popular Mirror's Quest in the November competition are: Peter Parslow of Warrington, Neil Nicholson of Stenley, C. J. Gray of Middlesbrough, F. J. Taylor of Middlesbrough, two thousand two hundred and forty, J. Reddy of Mill Hill, A. Gossard of Ipswich, P. Morgan of Bristol, Phil Sapiro of Liverpool, H. Gray of Sheffield, S. A. Siddiqui of Chesham, G. R. Barber of Sutton Coldfield, D. Davies of Bristol, R. B. Jones of Colchester, M. Corney of Plymouth, Clive Jones of Llanelli, E. A. Newman of Middlesbrough, A. R. Henderson of Stonegrove, J. Webster of Barnsley, Brian Holmes of Birmingham and T. Pascoe of Wexham.

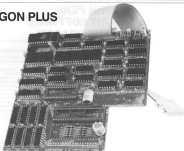
I won't be abusing about the Dragon's power of poetry again — there were certainly improbable tribulations from winners and losers alike. Favourite is:

A hacker who knows Microsoft
While travelling East took a meal
Though he liked sweetened dates
Poised to take to his fate,
But his favourite was meat's well
— and a special mention to S. A. Newman for his incomprehensible (though lyric)

Solution

See page 26

DRAGON PLUS



The best upgrade for your DRAGON: fast 80 by 24 screen, extra 64K memory, fits inside your DRAGON. Hundreds of satisfied users. Installation service available. Requires 64K DRAGON (upgrade service for DRAGON 32K — CALL US). Especially recommended for OS-9 users — get the 80 " 24 screen AND save the 6K overhead of the 51 column screen. Use Style and C without having to reboot. DRAGONPLUS — £109.00 — EDIT + CamtasticDisk for DRAGONPLUS.

FLEX DRIVERS

— £3.75

OS-9 Drivers

£14.95

£5.75

FLEX SOFTWARE

Get the best out of your DRAGON with FLEX operating system. 81 by 24 screen standard. 48K free memory for your programs. Includes the best 6809 assembler available for the DRAGON. DBASIC lets you run DRAGON BASIC programs — includes cheque book program. Requires 64K and disc drive.

FLEX Editor/Assembler/DBASIC

— £99.99

DYNACALC

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SPE word processing spell check.

— £55.00

RMS Database

£49.50

***** SPECIAL OFFER — complete package

— £199.00 *****

FORTH 83 for FLEX — complete implementation on two disks with source £25.00

The Best Modern software for the DRAGON 64

CHAT COMBO (chat plus 2, XMODEM, ChatViewdata) £16.00

ChatViewdata across PHETEL (across Dragon/Dos/FLEX) £14.95

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